DEUTZ Fire Protection

Engine Operation Manual
DFP4 2011 T10
DFP4 2011 T20

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Revision Notice
Revision 1.

California
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Revision History

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1	Sep-07	First Release

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1. General

1.1. About this Manual

This manual contains instructions for the DEUTZ DFP4-2011 series engines. Reading this manual will provide you with information enabling you to avoid accidents, preserve the manufactures warranty and maintain the engine.

1.1.1. Notices in this Manual

This symbol is used to communicate all safety warnings. Please follow all warnings in this manual carefully. In addition please follow all state and federal regulations associated with the use of this product.

1.2. DEUTZ Diesel Engines

DEUTZ engines are the product of many years of research and development. The resulting know-how coupled with stringent quality standards, guarantee their long service life, high reliability and low fuel consumption. As a result, DEUTZ diesel engines meet the highest standards for environmental protection.

1.2.1. Care and Maintenance

Sound care and maintenance practices will ensure that the engine continues to meet the requirements placed on it. Recommended service and maintenance intervals must be observed and carried out.

1.2.2. Safety Considerations

Please abide by the following:

1. **Shutdown the engine before carrying out maintenance or repair work**
2. **Ensure that the engine cannot be started accidentally**
3. **Replace any guards or panels that may have been removed**
4. **Observe industrial safety regulations when running the engine in an enclosed environment**

1.3. Service

In the event of a breakdown or for spare part inquiries please contact one of our authorized service representatives. Our trained specialists will carry out repairs quickly and professionally using genuine spare parts.

Original parts from DEUTZ AG are always produced in accordance with state-of-the-art technology. Please turn to the end of this manual for further service information.

1.4. Asbestos

DEUTZ original parts are asbestos-free

California

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

2. Engine and Fire Pump Unit Description

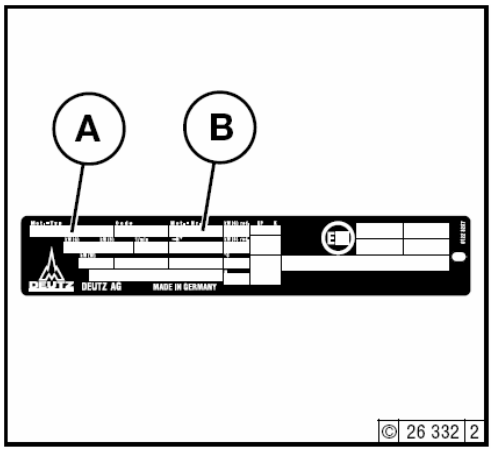
2.1. Model

Each DEUTZ engine has a Rating Plate that contains information about your engine (see section 2.1.1. below).

2.1.1. Engine Rating Plate

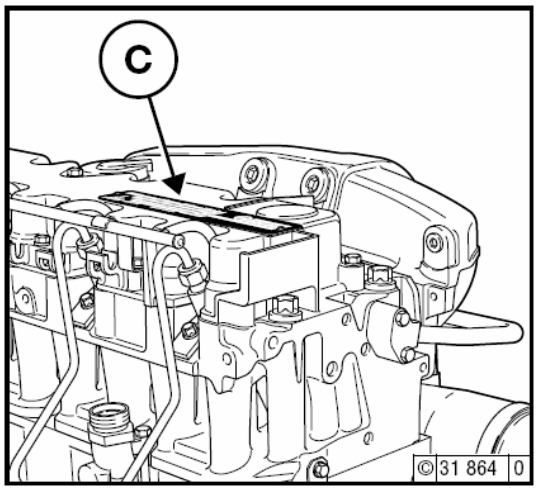
The DEUTZ rating plate contains performance information and the following:

A. Model Number
B. Engine Serial Number



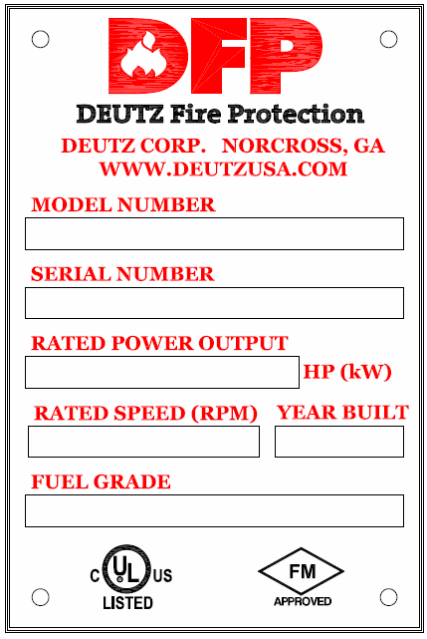
2.1.2. Position of the Engine Rating Plate

The rating plate **C** is attached to the valve cover (see below).



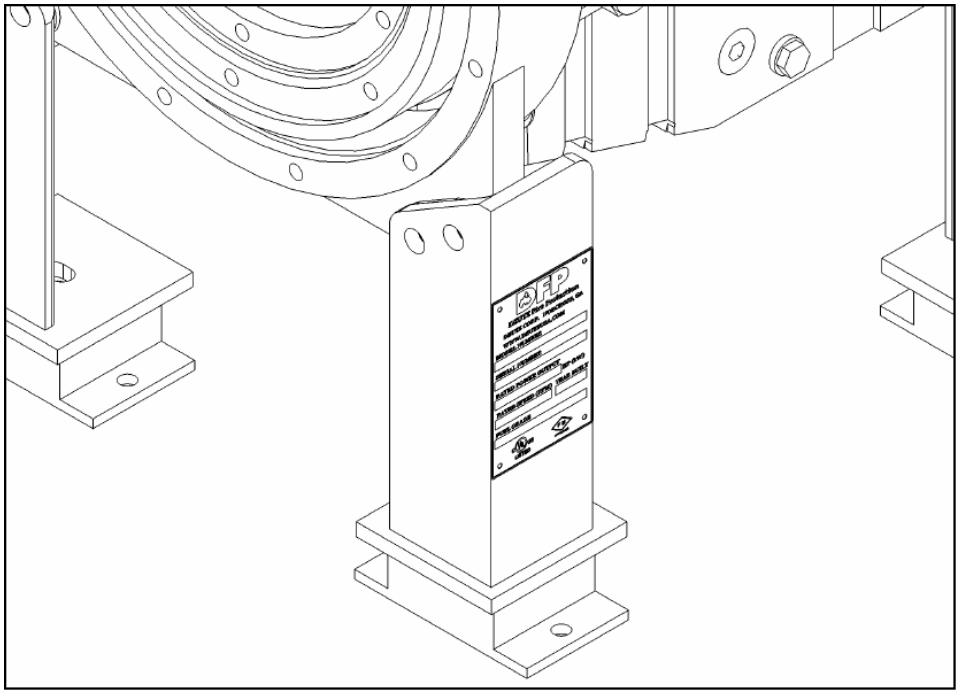
2.1.3. Fire Pump Rating Plate

The DEUTZ fire pump rating plate contains performance information for your particular model of fire pump.



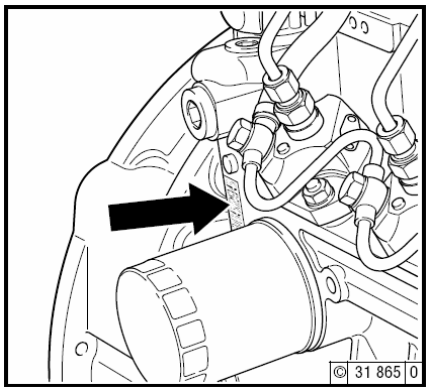
2.1.4. Location of the Fire Pump Rating Plate

The fire pump rating plate is located on the rear support leg as shown.



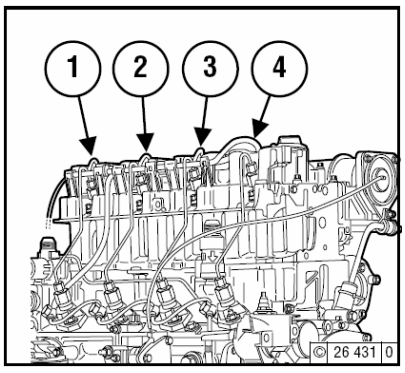
2.1.5. Engine Serial Number

The Engine serial number is also stamped on the engine as seen in the drawing below.



2.1.6. Cylinder Numbering

The cylinders are numbered consecutively, beginning at the flywheel.



2.1.7. Fuel Delivery Lock

Adjustments to the governor are to be carried out by authorized DEUTZ SERVICE specialists only.

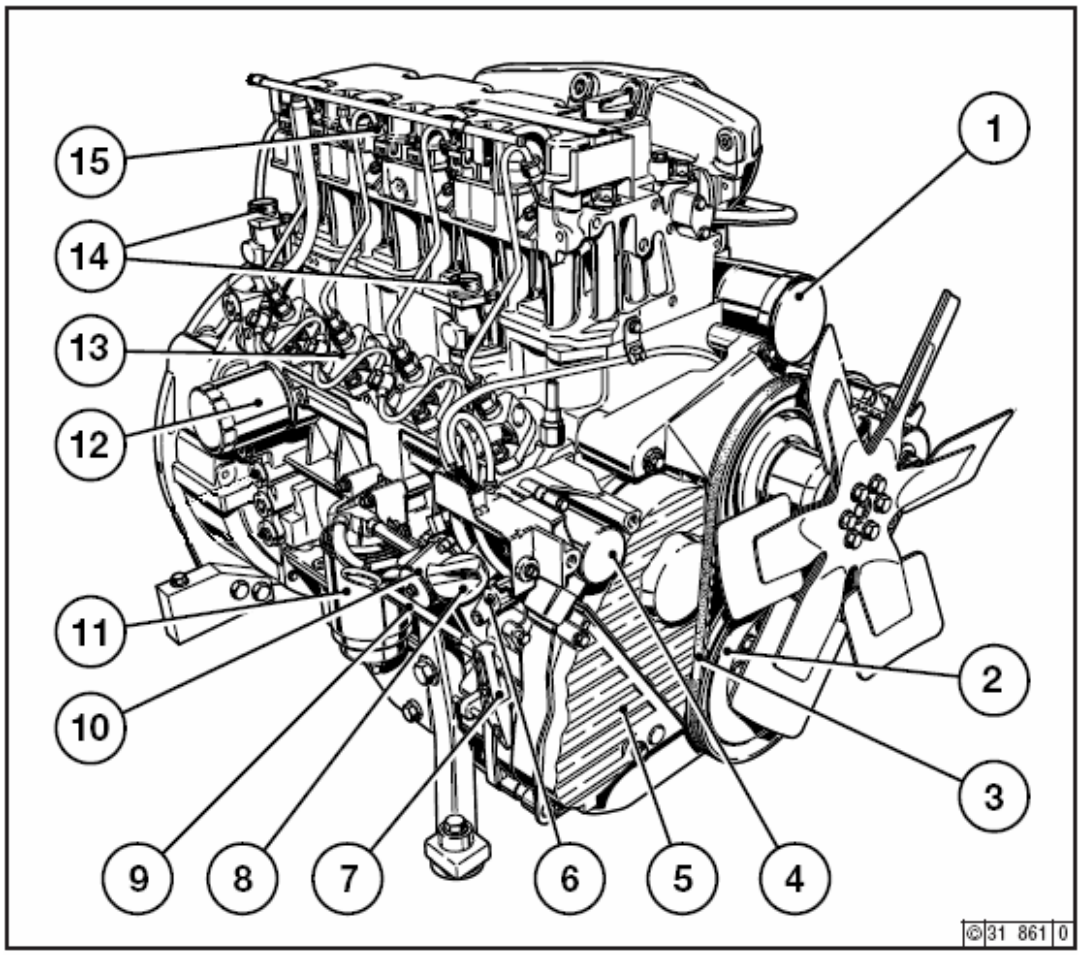
The manufacturer shall not be held liable for damages resulting from adjustments made to the governor by the operator. The lock screws are protected by the following methods:

1. Locking paint
2. Tamper resistant heads

2.2. Engine Illustrations

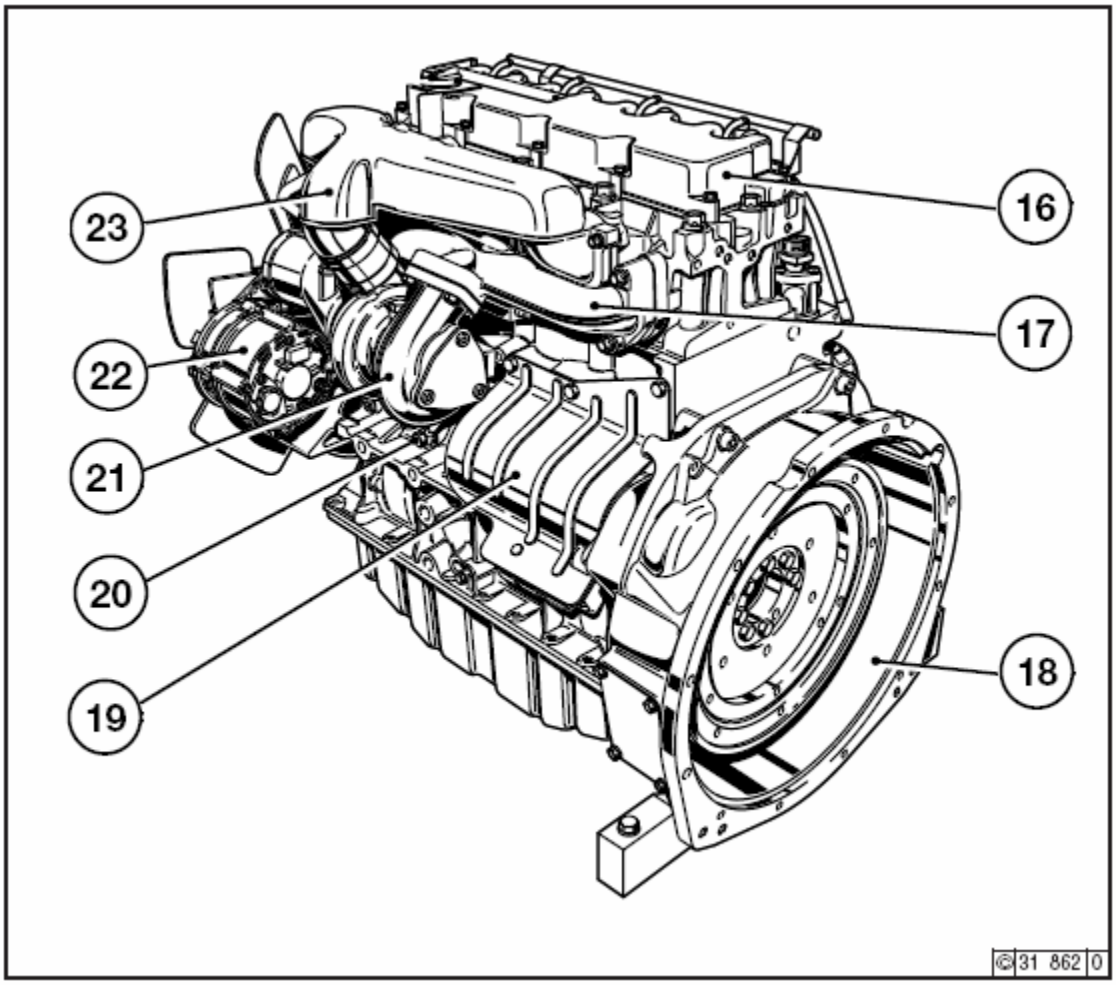
The purpose of this section is to identify the components of your DEUTZ engine.

2.2.1. Operation Side



1. **Air-intake pipe**
2. **V-belt pulley on crankshaft**
3. **Narrow V-belt**
4. **“Energized to stop” solenoid**
5. **Timing belt cover**
6. **Manual shut off lever**
7. **Speed control lever**
8. **Oil fill point (on side of crankcase)**
9. **Oil dipstick**
10. **Fuel Lift pump with hand primer**
11. **Spin-on fuel filter**
12. **spin-on oil filter**
13. **Injection pumps**
14. **Oil cooler connections**
15. **Injectors**

2.2.2. Exhaust Side

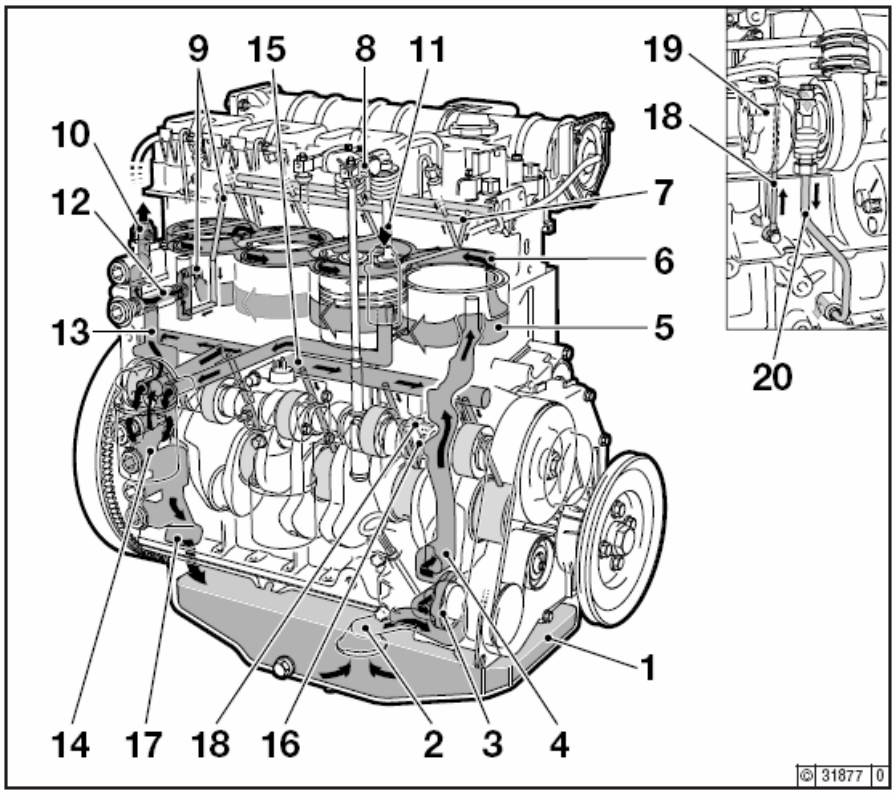


16. **Valve cover with built in crankcase ventilation**
17. **Exhaust manifold**
18. **Flywheel housing**
19. **Starter**
20. **Crankcase**
21. **Turbocharger**
22. **Alternator (not shown in actual position)**
23. **Intake Manifold**

2.3. Oil Circuit

The following section contains information regarding the oil circuit of your engine.

2.3.1. Lube Oil Circuit Schematic

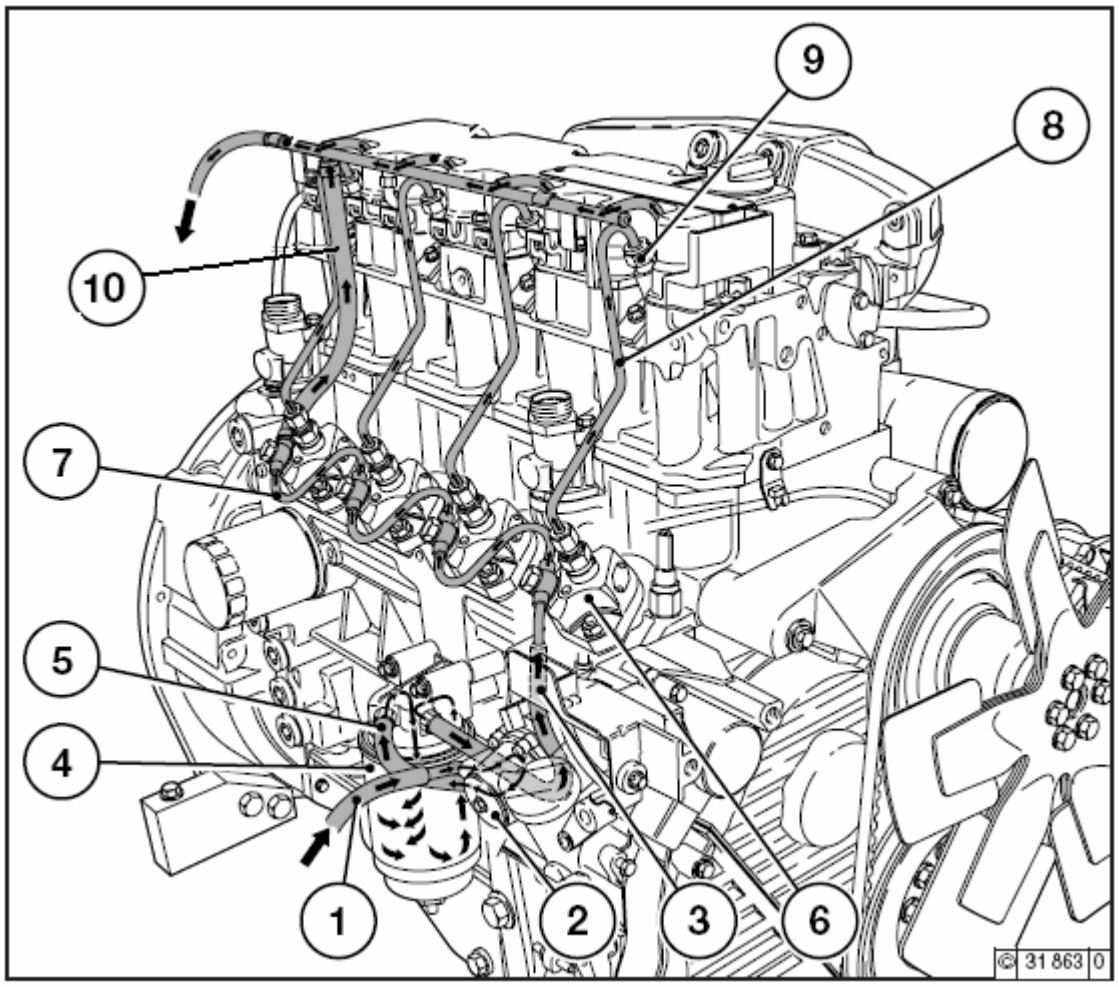


1. **Oil pan**
2. **Oil-intake pipe**
3. **Oil pump**
4. **Main oil duct**
5. **Oil-cooled cylinders**
6. **Cylinder head cooling neck**
7. **Oil duct for rocker arm lubrication**
8. **Rocker arm**
9. **Oil manifold for the thermostat**
10. **Outlet to external engine oil cooler**
11. **Return from external engine oil cooler**
12. **Thermostat housing with slide thermostat**
13. **Oil duct to oil filter**
14. **Oil filter**
15. **Oil duct to cam, con-rod and crankshaft bearings**
16. **Spray nozzle for piston cooling**
17. **Oil return via crankcase to oil pan**
18. **Lube Oil supply to turbocharger**
19. **Turbocharger**
20. **Return from turbocharger to oil pan**

2.4. Fuel System Schematic

The following section contains information regarding the fuel system of your engine.

2.4.1. Fuel System



1. **Fuel line from tank to fuel pump**
2. **Fuel lift pump (with built in pre-filter)**
3. **Fuel line from filter to injection pump**
4. **Easy-change fuel filter**
5. **Fuel line from fuel lift pump to easy-change fuel filter**
6. **Injection pump**
7. **Fuel distribution pipe**
8. **High pressure injection line**
9. **Injectors**
10. **Fuel return line to tank**

2.5. Cooling System

NOTE: Please follow all the maintenance and service procedures outlined in section 6.1 for your engine's lubrication system.

Engine coolant (i.e. water, Ethylene Glycol, inhibitors etc.) are **NOT** required for this engine.

The DFP4-2011 series engines are **oil cooled** and **do NOT require typical water/Glycol based coolant of any kind**. The crankcase lubricating oil is used as the engine coolant. The oil is cooled by the shell and tube style heat exchanger. As the oil passes through the shell side it's cooled by the raw water that is flowing through the tube side. As the oil exits the heat exchanger it is circulated back through the engine and the process repeats.

The heat exchanger is connected to the engine using hydraulic style hoses. It does not have any openings nor is an expansion tank required. The oil is drained and filled via the crankcase. It is not required to drain/change the oil in the heat exchanger during an oil change. For more information please refer to section 6.1, *Lubrication System*.

2.5.1. Oil Pan Heater

NOTE: The installation contractor is responsible for connecting the oil pan heater to the pump AC outlet.

DO NOT drain the oil from the oil pan until the oil pan heater is disconnected.

DO NOT connect the oil pan heater until the engine is properly filled with oil.

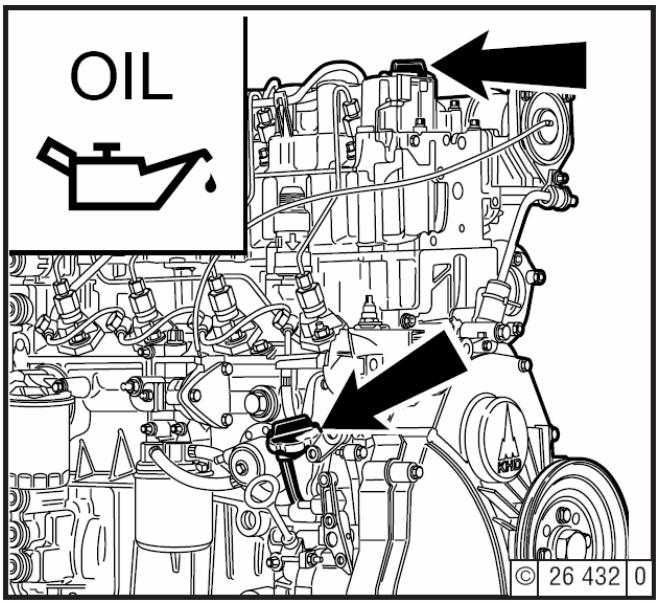
The Deutz DFP4-2011 engines are equipped with an oil pan heater that keeps the oil warm, which assists with engine cranking. It also helps the engine achieve its maximum rated horsepower faster.

3. Engine Operation

3.1. Commissioning

This section contains information regarding the operation of your engine.

3.1.1. Adding Engine Oil



3.1.1.1. Initial Engine Oil Fill-Up

NOTE: If the person operating the engine does not warm up the engine until the thermostat opens, the oil level may lie above the "**Max**" mark on the dipstick when delivered. The correct level can then only be assessed after the engine has been warmed up.

Please follow the steps below to add engine oil:

1. Add oil to the engine until the oil level reaches "**Max**" indicated on the engine dipstick.

2. In addition, top off the oil quantity in the supply hoses and external oil cooler. See section 8.2 for quantities.

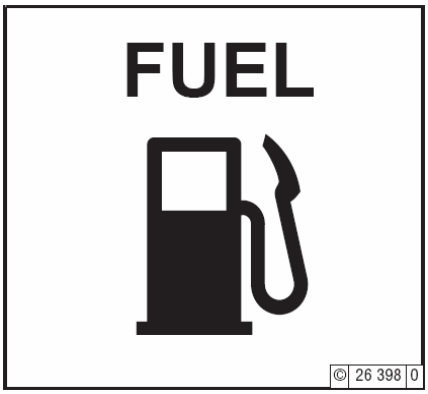
3. Allow the engine to run warm until the thermostat opens (at approximately 95 degrees C)

4. Allow the engine to run for an additional 2 minutes

5. Switch off the engine, wait 5 minutes to allow the oil to drain back to the oil pan.

6. Check the oil level, and if necessary, top off with oil to the "**Max**" mark on the dipstick.

3.1.2. Adding Fuel



Use only commercial-grade diesel fuel. For fuel grade, see section 4.2. Use summer or winter-grade fuel, depending on the ambient temperature.

- Never fill the tank while the engine is running.
- Ensure cleanliness!
- Do not spill fuel!
- **DO NOT** use **BIO-DIESEL**; bio-diesel can cause the fuel injection components to stick if the engine is not run for an extended period of time.

3.1.3. Other Preparations

- Check battery and cable connectors, (see section 6.7.1)
- Remove Transport Shackles, if fitted: (see section 6.7.3)
- After all engine preparations have been done conduct a trial run for about 10 minutes with the engine **UNLOADED.**

NOTE: During and after the trial run check for the following:

- **Leaks**
- **Oil level (see section 6.1.2)**
- **Top off with oil; if necessary (see section 3.1.1.)**
- **Re-tension the V-belt (see section 6.5)**

3.1.4. Additional Maintenance Work

When commissioning a new or reconditioned engine all of the following **MUST** be done:

- Change the lube oil (see sections 6.1.1. & 6.1.2.)
- Change the oil filter cartridge (see section 6.1.3.)
- Change the fuel filter cartridge (see section 6.2.1.)
- Check V-belts and re-tension as needed (see section 6.5)
- Check engine for leaks
- Check engine mounts, retighten if necessary, (see section 9.2)
- Check valve clearance, adjust if necessary, (see sections 5.1 & 6.6.1)

3.2. Starting

This section illustrates the method for starting your engine.

Before starting the engine, be mindful of the warnings below:

When manually starting the engine, make sure that the cooling water valve is open to the engine's heat exchanger.

Make sure that nobody is standing in the immediate vicinity of the engine or driven components.

After any repair work: Check that all guards have been replaced and that all tools have been removed from the engine.

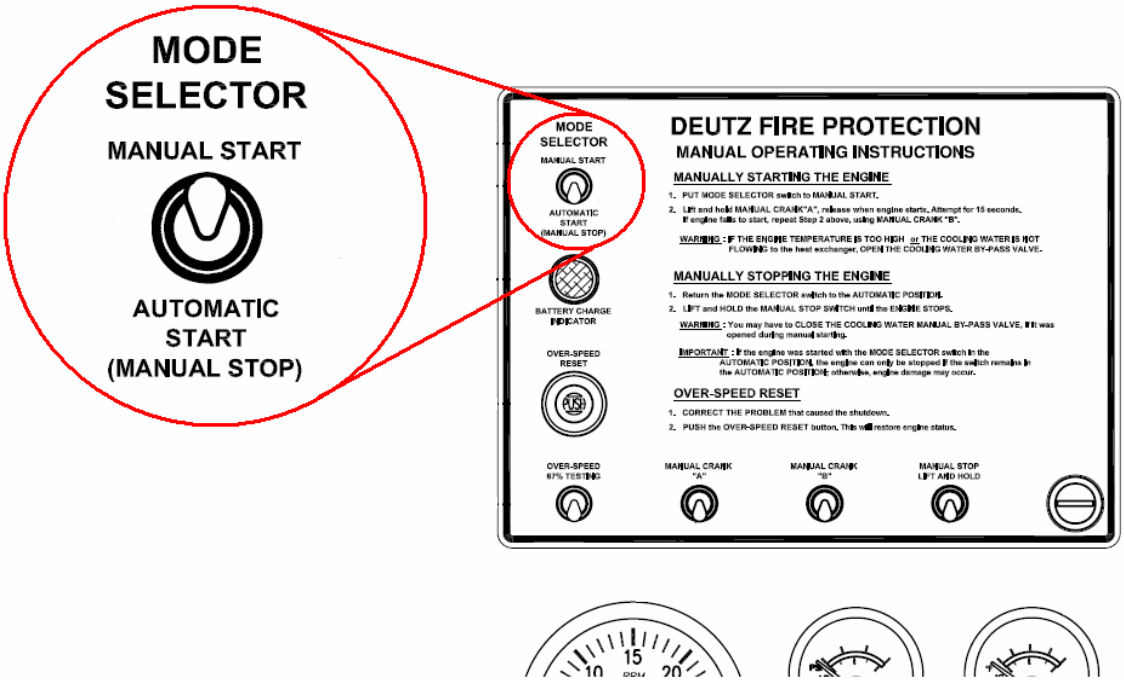
CAUTION: If the speed governor has been REMOVED, the engine must NOT be tested under any circumstances.

3.2.1. Electric Starting

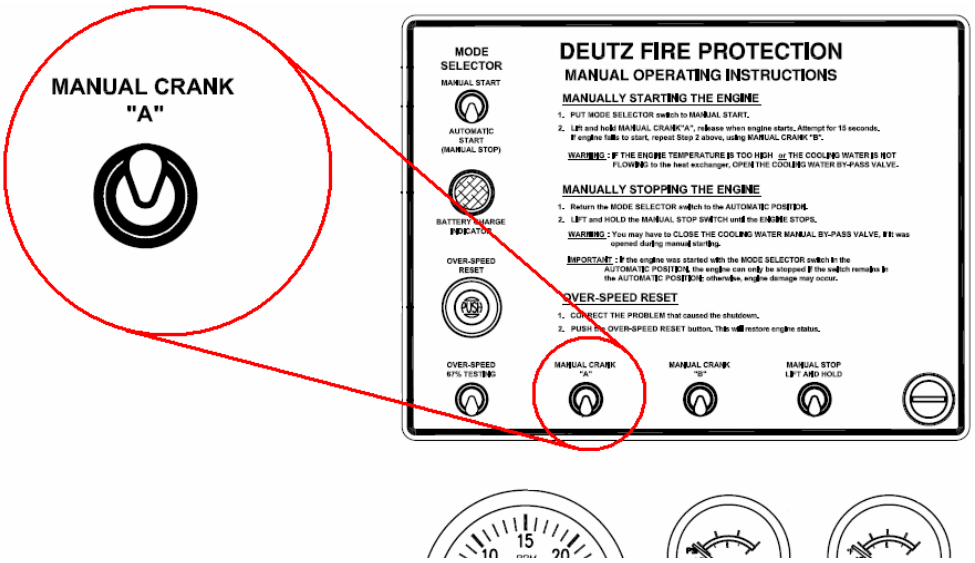
NOTE: Do not engage the starter for more than 15 seconds at a time. If the engine doesn't start, wait a minute and then try again. If the engine doesn't start after multiple attempts, then inspect the engine to ensure it's been setup properly. Please refer to your engine's maintenance, service and trouble shooting guides for further information.

3.2.2. Without cold start assistance

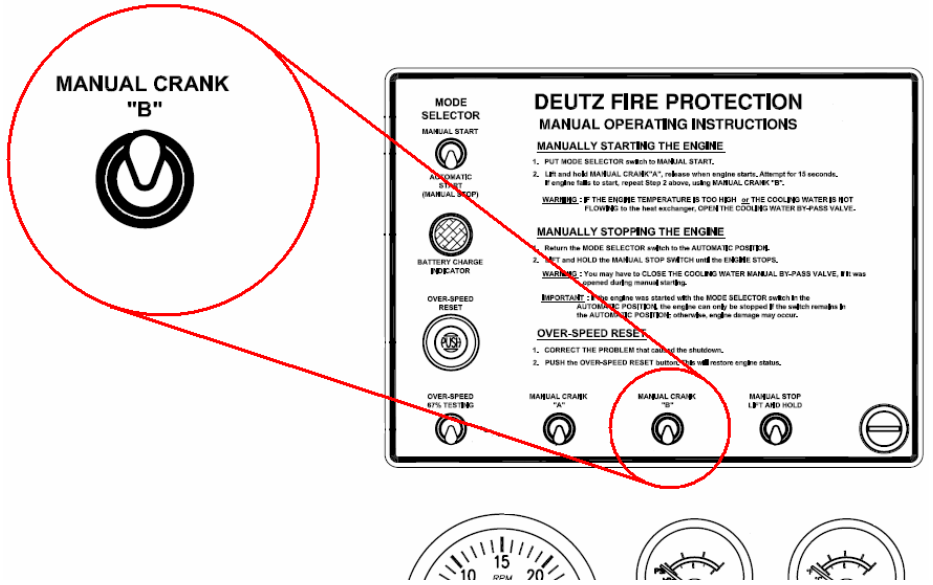
1. Put the MODE SELECTOR switch to MANUAL START.



2. Lift and hold the "MANUAL CRANK A" switch, releasing it when the engine starts. Attempt to start the engine for 15 seconds (see below).


MANUAL CRANK
"A"
MODE
SELECTOR
MANUAL START
AUTOMATIC
START
(MANUAL STOP)
BATTERY CHARGE
INDICATOR
OVER-SPEED
RESET
OVER-SPEED
67% TESTING
MANUAL CRANK
"A"
MANUAL CRANK
"B"
MANUAL STOP
LIFT AND HOLD
DEUTZ FIRE PROTECTION
MANUAL OPERATING INSTRUCTIONS
MANUALLY STARTING THE ENGINE
1. PUT MODE SELECTOR switch to MANUAL START.
2. Lift and hold MANUAL CRANK"A", release when engine starts. Attempt for 15 seconds.
If engine fails to start, repeat Step 2 above, using MANUAL CRANK "B".
WARNING : IF THE ENGINE TEMPERATURE IS TOO HIGH or THE COOLING WATER IS NOT
FLOWING to the heat exchanger, OPEN THE COOLING WATER BY-PASS VALVE.
MANUALLY STOPPING THE ENGINE
1. Return the MODE SELECTOR switch to the AUTOMATIC POSITION.
2. LIFT and HOLD the MANUAL STOP SWITCH until the ENGINE STOPS.
WARNING : You may have to CLOSE THE COOLING WATER MANUAL BY-PASS VALVE, if it was
opened during manual starting.
IMPORTANT : If the engine was started with the MODE SELECTOR switch in the
AUTOMATIC POSITION, the engine can only be stopped if the switch remains in
the AUTOMATIC POSITION; otherwise, engine damage may occur.
OVER-SPEED RESET
1. CORRECT THE PROBLEM that caused the shutdown.
2. PUSH the OVER-SPEED RESET button. This will restore engine status.
10
15
20

3. If the engine doesn't start, lift and hold the "MANUAL CRANK B" switch and release it once the engine starts. Attempt to start the engine for 15 seconds.


MANUAL CRANK
"B"
MODE
SELECTOR
MANUAL START
AUTOMATIC
START
(MANUAL STOP)
BATTERY CHARGE
INDICATOR
OVER-SPEED
RESET
OVER-SPEED
67% TESTING
MANUAL CRANK
"A"
MANUAL CRANK
"B"
MANUAL STOP
LIFT AND HOLD
DEUTZ FIRE PROTECTION
MANUAL OPERATING INSTRUCTIONS
MANUALLY STARTING THE ENGINE
1. PUT MODE SELECTOR switch to MANUAL START.
2. Lift and hold MANUAL CRANK"A", release when engine starts. Attempt for 15 seconds.
If engine fails to start, repeat Step 2 above, using MANUAL CRANK "B".
WARNING : IF THE ENGINE TEMPERATURE IS TOO HIGH or THE COOLING WATER IS NOT
FLOWING to the heat exchanger, OPEN THE COOLING WATER BY-PASS VALVE.
MANUALLY STOPPING THE ENGINE
1. Return the MODE SELECTOR switch to the AUTOMATIC POSITION.
2. LIFT and HOLD the MANUAL STOP SWITCH until the ENGINE STOPS.
WARNING : You may have to CLOSE THE COOLING WATER MANUAL BY-PASS VALVE, if it was
opened during manual starting.
IMPORTANT : If the engine was started with the MODE SELECTOR switch in the
AUTOMATIC POSITION, the engine can only be stopped if the switch remains in
the AUTOMATIC POSITION; otherwise, engine damage may occur.
OVER-SPEED RESET
1. CORRECT THE PROBLEM that caused the shutdown.
2. PUSH the OVER-SPEED RESET button. This will restore engine status.
10
15
20

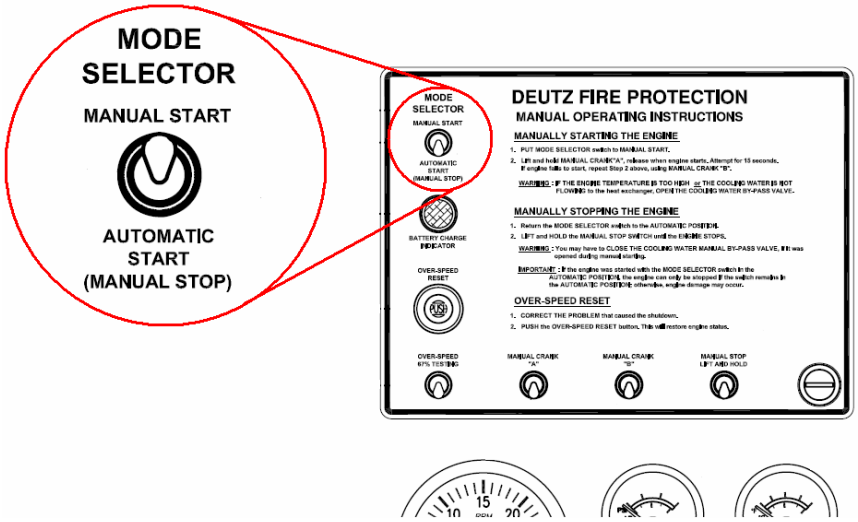
4. If the starter engages and turns the engine but it doesn't crank and run; then alternate between the "MANUAL CRANK A" and "MANUAL CRANK B" switches. Use each switch five times while alternating between them.

5. If the starter engages for every starting attempt and the engine fails to run; then consult the fault table in section 7.1 or call the DEUTZ service department.

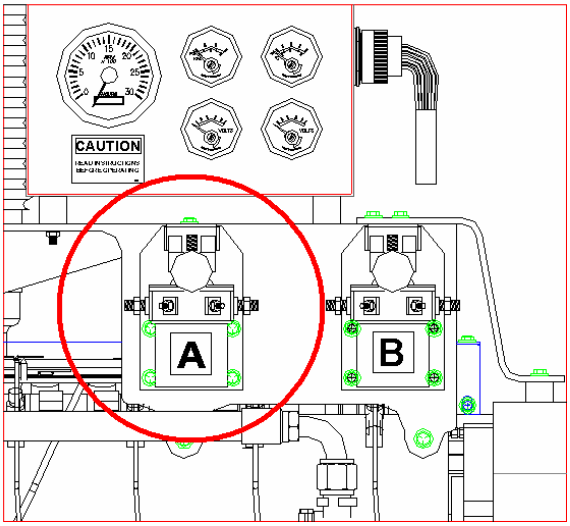
6. If the starter fails to engage and crank the engine then try starting the engine manually as outlined in section 3.2.3 entitled "*Manual Solenoid Operation*".

3.2.3. Manual Solenoid Operation

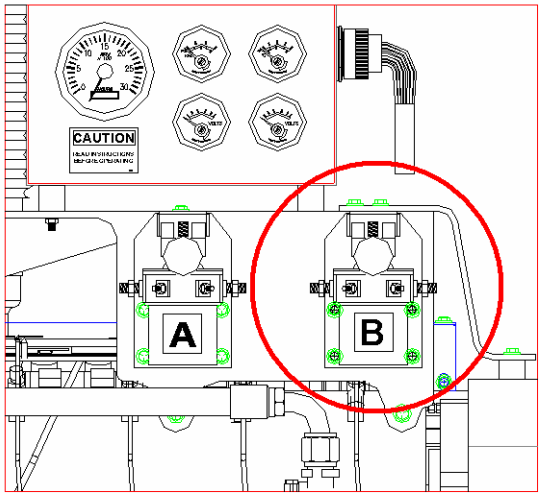
1. Put the MODE SELECTOR switch to MANUAL START.



2. Lift and hold the manual crank "A" solenoid lever and release it once the engine starts. Attempt to start the engine for no longer than 15 seconds.



3. If the engine **does not** start then repeat step 2 above using the manual crank “B” solenoid lever.



4. If the starter engages and turns the engine but it doesn’t crank and run; then alternate between the “MANUAL CRANK A” and “MANUAL CRANK B” solenoid levers. Use each switch five times while alternating between them.

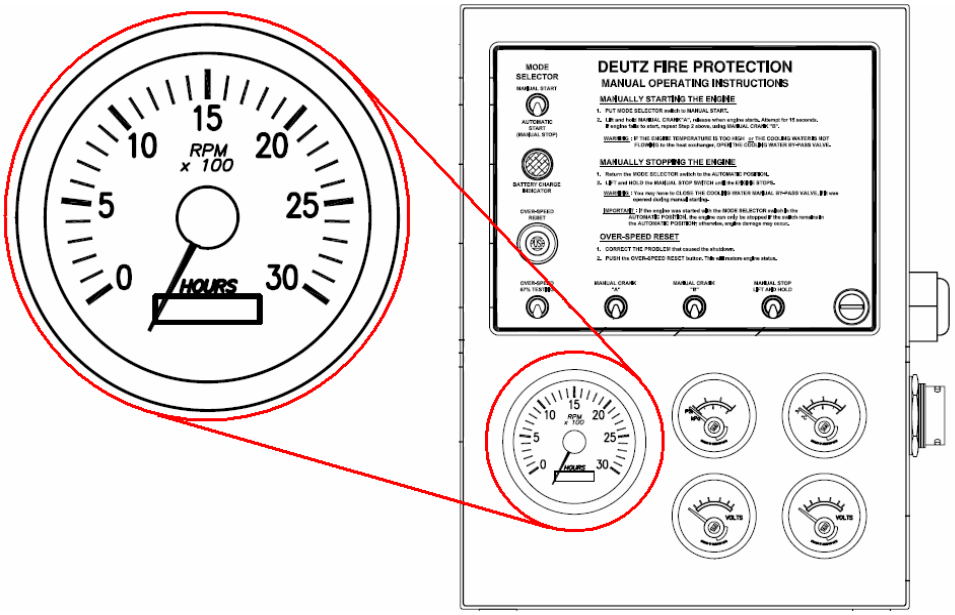
5. If the starter engages for every starting attempt and the engine fails to run; then consult the fault table in section 7.1 or call the DEUTZ service department.

3.3. Monitoring Engine Operation

This section contains information about monitoring the operation of your DEUTZ engine.

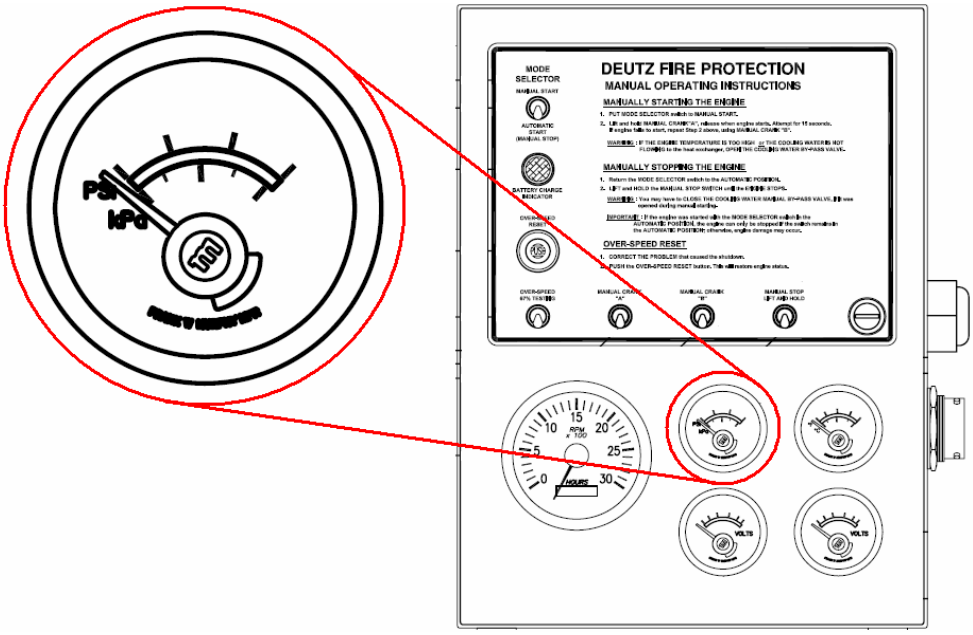
3.3.1. Tachometer / Hour Meter

The tachometer displays the speed at which your engine is running. Built into the tachometer is a digital display for engine operation hours. This display will only count up while the engine is running, see below.



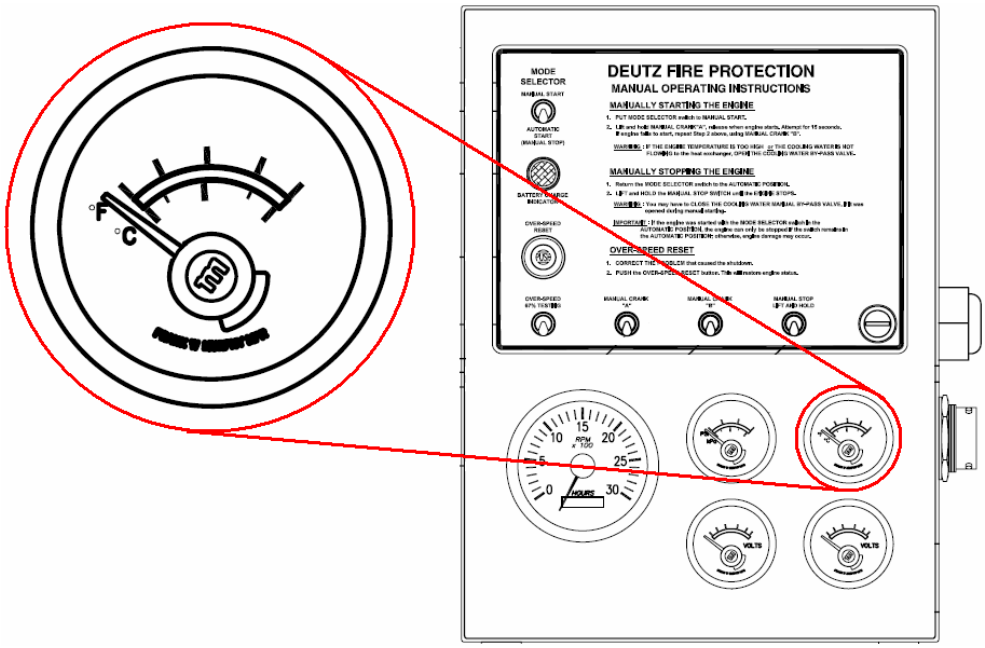
3.3.2. Oil Pressure Indicator

The pointer must indicate a minimum oil pressure (3.0 bar or 43psi) while the engine is running.



3.3.3. Coolant Temperature Gage

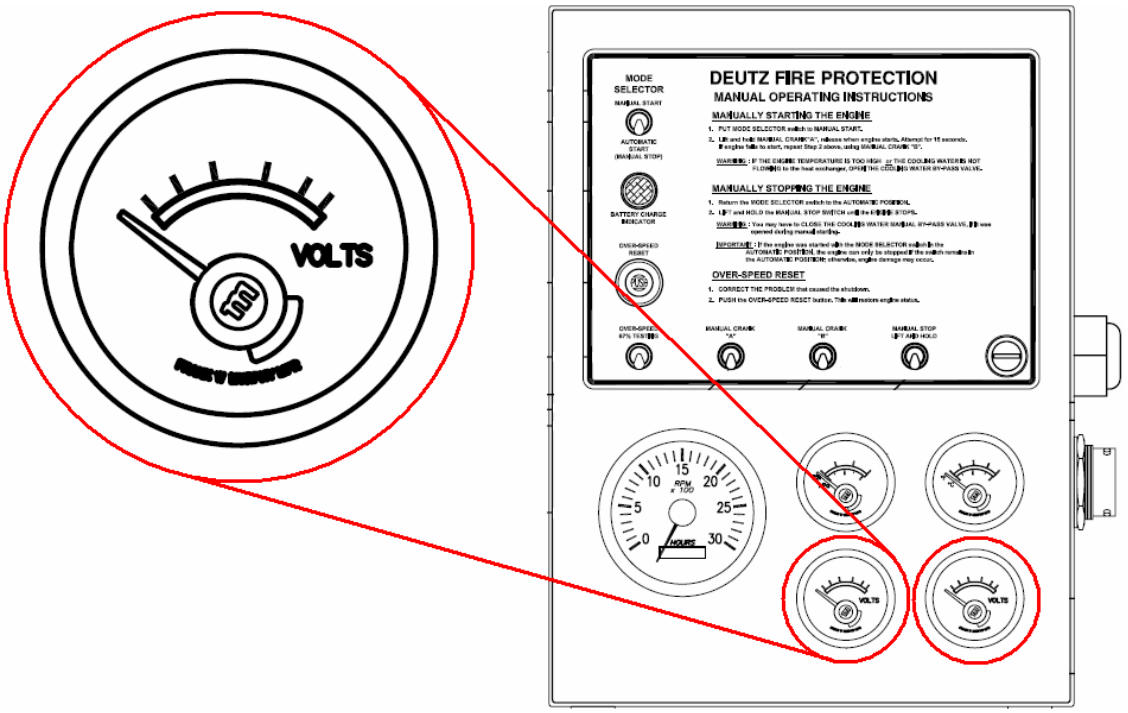
NOTE: The pointer will typically indicate that the engine is operating in the 93-110°C or 200-230°F range. If the indicator displays an abnormally high temperature (above 250°F or 121°C) then the engine is starting to overheat. If this occurs, shut the engine down and refer to the fault table in section 7.1.



3.3.4. Volt Meter

The two volt meters, pictured below, monitor the voltage of the primary and secondary engine battery. While the engine is running the normal voltage should read:

- **13 to 14.5 Volts** for a 12V system
- **26 to 28 Volts** for a 24V system



3.4. Shutting Off the Engine

The information in this section pertains to shutting down your DEUTZ engine.

3.4.1. Electric Shut-Off

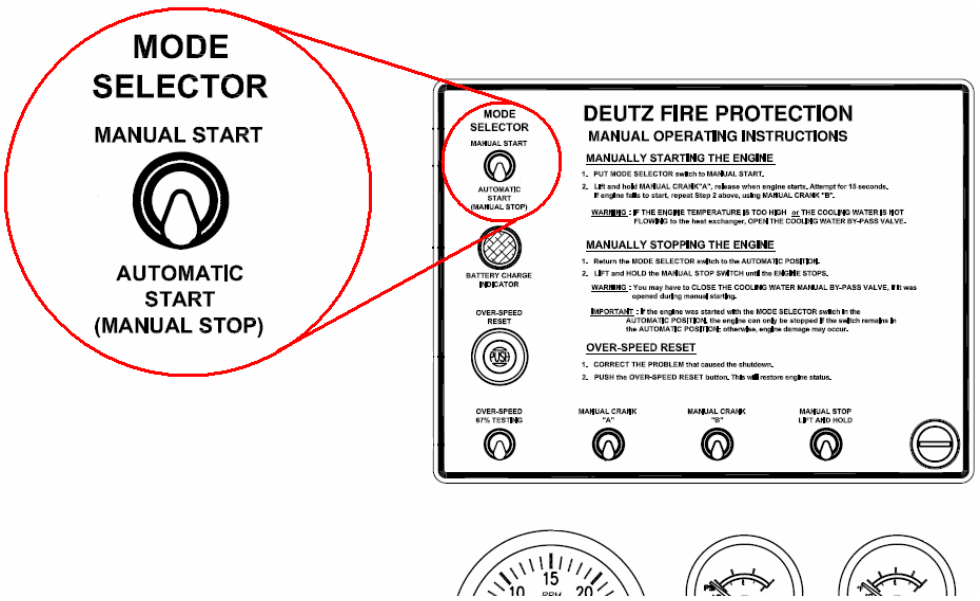
NOTE: If possible, **do not** switch the engine off while fully loaded

If the **cooling water manual by-pass valve** was opened during manual starting, make sure it's **CLOSED after** shutdown.

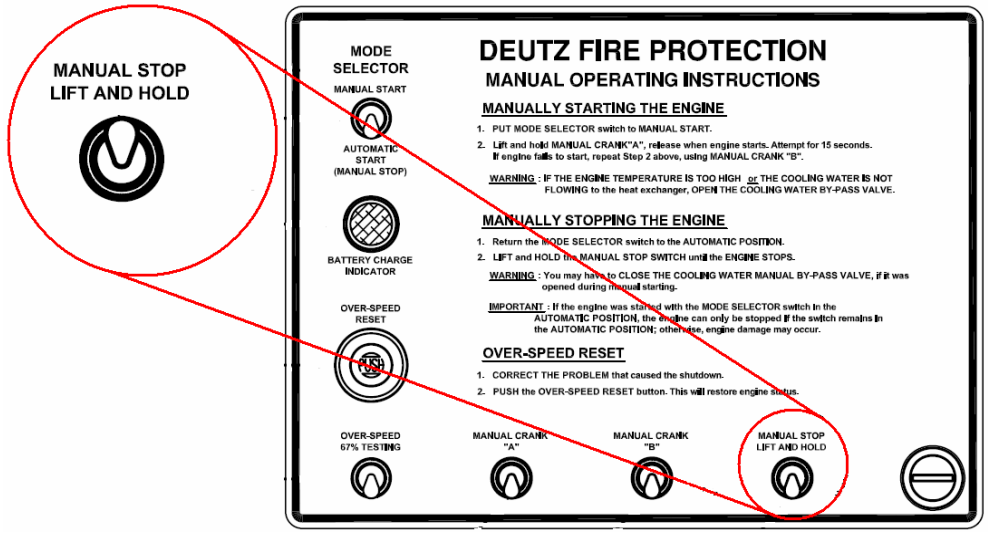
If the engine was started with the MODE SELECTION switch in the AUTOMATIC position, the engine can only be stopped if the switch is in the AUTOMATIC POSITION; otherwise, **engine damage can occur.**

Please follow the step(s) below to properly shutdown your engine:

1. Return the mode selector switch back to the AUTOMATIC START position.



2. Lift and hold the MANUAL STOP switch until the engine stops.



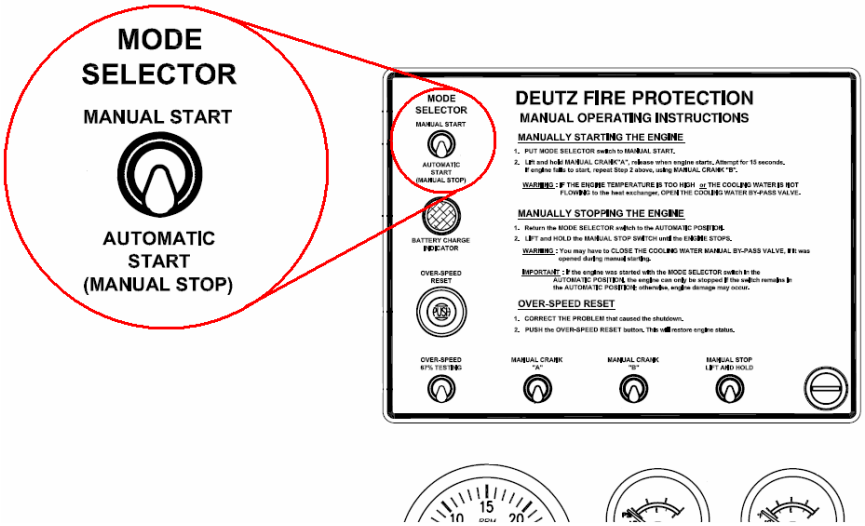
NOTE: The battery charge light will illuminate when the engine stops.

3.4.2. Mechanical Shut-Off

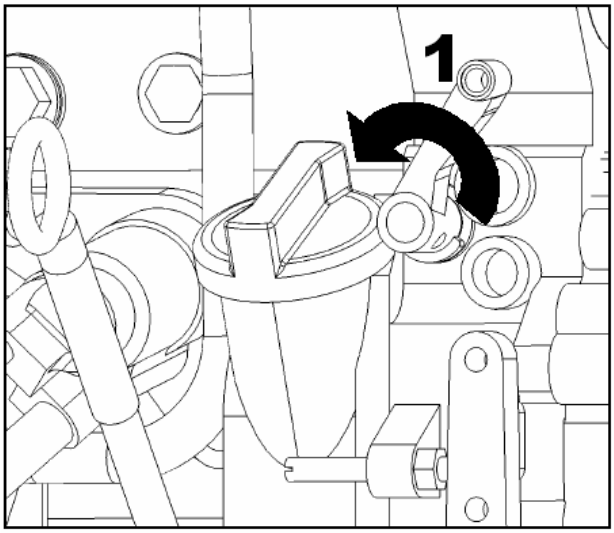
Please follow the step(s) below to properly shutdown your engine:

NOTE: If possible, **do not** switch the engine off while fully loaded. If this is not possible, allow it to idle for approximately 2 minutes before shutdown.

1. Return the mode selector switch back to the AUTOMATIC START position



2. Move the shut-off lever **1** until the engine comes to a stop. (NOTE: The charge battery light will illuminate when the engine stops.)



3.5. Operating Conditions

The following information pertains to the operating conditions that your DEUTZ engine may be in.

3.5.1. High Ambient Temperature and Altitude

As the ambient temperature and/or altitude increases the air density decreases. As a result, the following engine characteristics will be **IMPAIRED**:

- Engine maximum output
- Exhaust gas quality
- Increased Coolant temperature
- Starting behavior (in extreme cases):

The Engine can be used at altitudes up to **91m (300ft)** and temperatures up to **25°C (77°F)** without a decrease in performance. If the engine is to be used at higher altitudes and temperatures then the amount of injected fuel must be **REDUCED**. This will **DECREASE** engine power per NFPA regulations as follows:

- Deduct 1% for each 100m (328 ft) above 91 m (300 ft)
- Deduct 1% for each 5.6°C (10°F) above 25°C (77°F)

If you have any doubts about the operation of your engine under these or similar conditions, ask your equipment supplier. Otherwise please contact DEUTZ SERVICE.

4. Operating Media

The information in this section explains the lube oil and fuel that is used in your DEUTZ engine.

4.1. Lube Oil

NOTE: Only use **15W40** oil in your DEUTZ engine.

Lube Oils are categorized and rated according to their performance and quality. Oil specifications are designated by the American Petroleum Institute (**API**) and the European Automobile Manufacturers Association (**ACEA**)

4.1.1. Quality

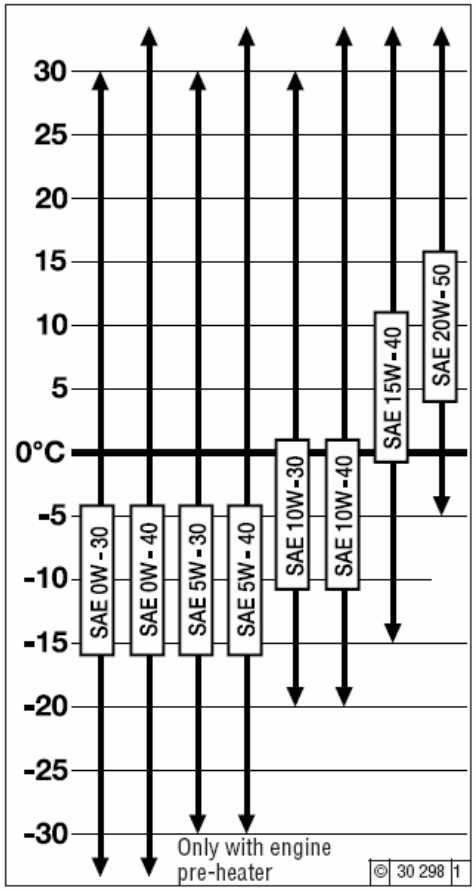
The following are the approved **API** and **ACEA** lube oils for your engine:

Approved API Oils:
Minimum: CF-4

Approved ACEA Oils:
Minimum: E1-96

4.1.2. Viscosity

Oil changes that are governed by the seasons can be avoided by using multi-grade lube oils. Multi-grade oils, particularly **light-flowing oils**, help **reduce** fuel consumption. This engine is equipped with an oil pan heater. Since it is designed and intended to operate continuously the engine oil will always be warm. Therefore, 15W40 viscosity oil can be used year round. Otherwise please use the chart below to determine the proper viscosity of oil that is to be used in your engine.



4.2. Fuel

The information in this section refers to the fuel that should be used in your DEUTZ engine.

4.2.1. Quality

Use commercially available diesel fuel with less than 1.0% sulfur content. Fuels with a sulfur content greater than 1% are not allowed. The following are the approved fuel specification / standards to be used with your DEUTZ Fire Protection Engine:

- EN 590: 2004
- ASTM D 975-96; 1-D and 2-D

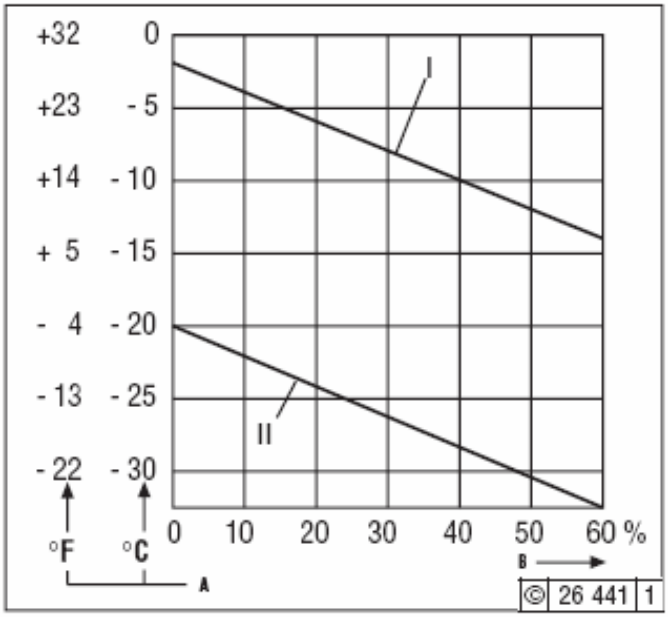
4.2.2. Winter-Grade Fuel

Diesel fuels are **never** to be mixed with gasoline (petrol)!

Mix in tank only! Fill with the appropriate amount of Kerosene first, and then add the diesel fuel.

At low temperatures waxing **may** occur in the fuel system thus reducing engine efficiency. If the ambient temperature is less than 0°C or 32°F, winter grade fuel (suitable down to -15°C or 5°F) should be used. This type of fuel is usually available from filling stations well in advance of the cold months. Diesel fuel containing additives (Super diesel) is often on sale and for use down to temperatures of -20°C or -4°F.

- At temperatures below -15°C (5°F) to -20°C (-4°F), Kerosene should be added to the diesel fuel. The relevant percentages are given in the diagram below.



Legend:	
I	Summer-grade diesel fuel
II	Winter-grade diesel fuel
A	Ambient temperature
B	Percentage of kerosene added

If summer-grade diesel fuel must be used at temperatures below 0°C or 32°F, up to 60% kerosene can be added. In most cases, adding a flow improver (additive) can be used to provide the fuel with adequate resistance to the cold temperatures. Please contact DEUTZ SERVICE for more information regarding fuel additives.

5. Service Schedules and Charts

This section describes the service plan that you should follow to keep your DEUTZ engine in top running condition.

5.1. Service Plan

Item	THE ITEMS BELOW ARE TO BE CHECKED EVERY YEAR
General Inspection	Check the engine for loose or damaged fittings, clamps, guards insulating blankets or wiring. Repair or replace as necessary. Inspect V-belts for looseness or wear and tight connections.
Battery	Clean battery terminal posts, check for tight connections and maintain electrolyte level . NOTE: Replace as needed but do not exceed 5 years
Engine Oil	Replace oil
Oil Filter	Replace oil filter
Exhaust system	Visually inspect the exhaust system hangers, supports and flexible pipes for signs of leakage or rusting. Repair or replace damaged piping.
Engine Crankcase Breather	Clean the engine crankcase breather
Fuel Filter	Replace the fuel filter
Fuel Pre-filter Element	Clean / change pre-filter element
Fuel Tank	Drain water and sediment from the fuel tank
Cooling Loop Solenoid and Y-Trap (Not supplied by DEUTZ)	Check for proper operation
Power Wiring	Inspect and clean terminals on the starter, alternator and the battery isolator.
Engine Control Panel	Inspect the connections and tighten if necessary. Be careful not to ground any circuits
Heat Exchanger	Inspect the heat exchanger conduits
Engine Operation Test	1. Start the engine: Run the engine for no less than 30 minutes 2. Check for proper gauge readings 3. Check for noises and vibrations. Tighten loose components. 4. Perform backpressure test on the exhaust system.
Engine Over-speed Test	Perform over-speed test using the "Over speed" switch
Post-operation Inspection	1. Stop the engine 2. Verify that the Mode Selector switch has been returned to "Automatic" 3. Ensure that the fuel tank is at least two-thirds full 4. Check for leaks in coolant hoses, fuel supply and return lines etc.

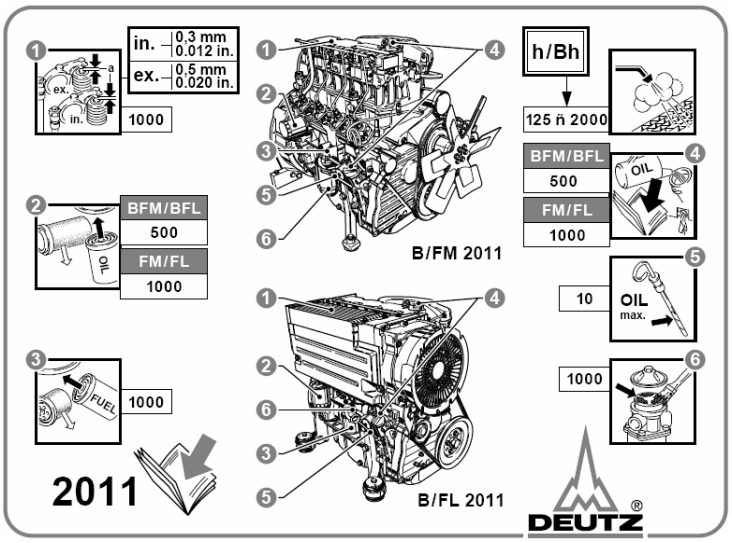
The items below are to be checked every 5 years in addition to the yearly maintenance schedule.

Item	THE ITEMS BELOW ARE TO BE CHECKED EVERY 5 YEARS
General Inspection	Replace V-belts
Air Filter	Replace air filter
Batteries	Replace batteries
Fuel Lines	Replace fuel supply and fuel return lines
Injectors	Check
Valves Clearance	Adjust if necessary
Cooling System	Clean

5.2. Maintenance Chart

Stop the engine before carrying out any maintenance work.

The maintenance chart shown below is supplied as a self-adhesive label with each engine. It should be placed where it can be seen clearly on the engine or driven equipment. Please check to ensure that this is or has been done. If necessary, ask your engine or equipment supplier for a fresh supply of labels.



NOTE: Routine work should be carried out according to the schedule outlined in section 5.1.

5.3. Maintenance Work Completed

Please use the chart below to keep a log of the maintenance that has been done on your engine.

Op. Hours	Date	Signature	Op. Hours	Date	Signature
50-150*			-		
125			250		
375			500		
625			750		
875			1000		
1125			1250		
1375			1500		
1625			1750		
1875			2000		
2115			2250		
2375			2500		
2625			2750		

* Break-in Service

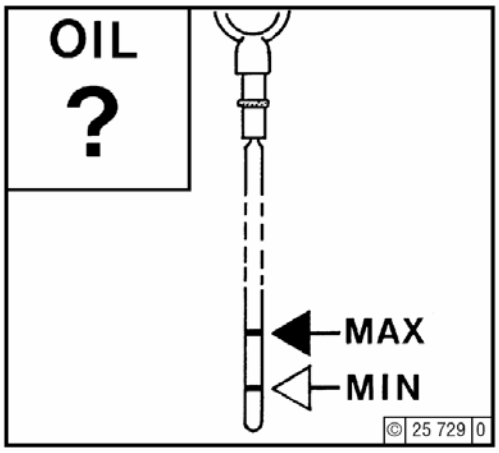
6. Service and Maintenance

This section describes the different maintenance procedures that are required for your engine.

6.1. Lubrication System

The following information pertains to the maintenance of your engines' lubrication system.

6.1.1. Checking the Oil Level



Please follow the steps below to check your engine oil:

1. Switch the engine off
2. Wait 5 minutes for the oil to drain back into the oil pan
3. Remove the oil dipstick
4. Wipe the dipstick with a non-fibrous, clean cloth
5. Insert the dipstick fully and remove again
6. Check the oil level and fill up to "**MAX**" on the dipstick (if necessary)
    a. If the oil level is only just above the "**MIN**" mark, then more oil must be added.

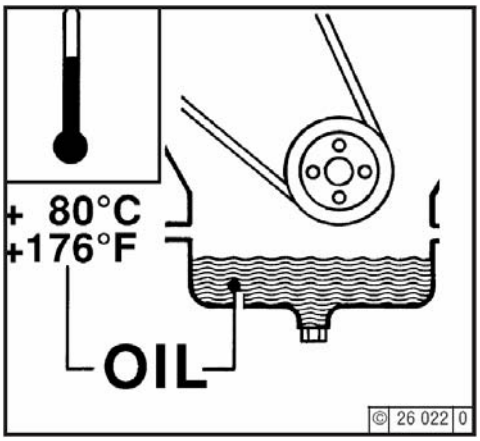
NOTE: The Oil level should not be allowed to fall below the "**MIN**" mark or above the "Max" mark.

6.1.2. Changing the Engine Oil

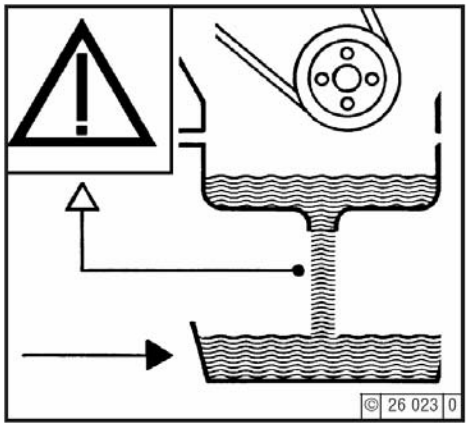
Use caution when draining hot oil: Risk of scalding!

Collect the oil in a container. Do not allow the drained oil to run into the soil. Dispose of the oil in accordance with environmental regulations.

To change the oil please follow the steps below:



1. Start the engine
2. Allow the engine to warm up
3. Ensure that the engine or vehicle is level
    a. Lube oil temperature should be approximately 80°C (176°F)
4. Switch the engine off



5. Place an oil tray under the engine
6. Unscrew the oil drain plug
7. Drain the oil

8. Fit the oil drain plug with a new seal ring and tighten firmly (for torque, see section 8.2)

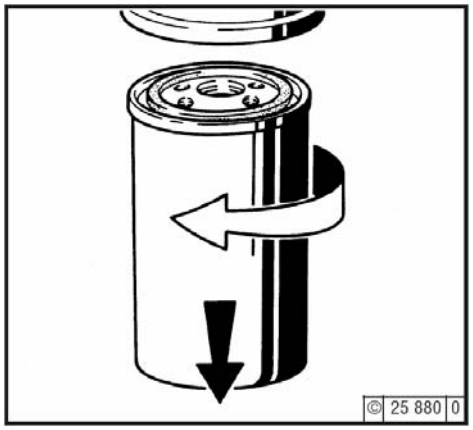
9. Pour in fresh lube oil
    a. For grade / viscosity information see section 4.1
    b. For quantity information see section 8.2

10. Check the oil level, see section 6.1.2

6.1.3. Changing the Oil Filter

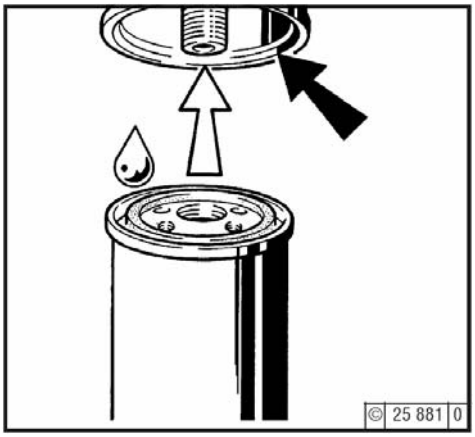
Please follow the steps below to change the oil filter:

Risk of scalding!

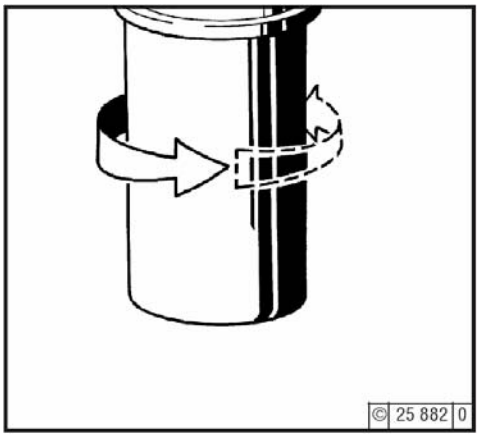


1. Unscrew the lube oil filter cartridge using a commercial tool and spin it off.

2. Catch any oil that may spill out.



3. Clean any dirt from the filter carrier sealing surface
4. Lightly oil the rubber gasket of the new lube oil filter cartridge
5. Manually screw in the new cartridge until the gasket is flush.



6. Tighten the lube oil filter cartridge with another half-turn by hand
7. Check the oil level, see section 6.1.2
8. Check the oil pressure, see section 3.3.1
9. Check the lube oil filter cartridge seal for leaks

6.2. Fuel System

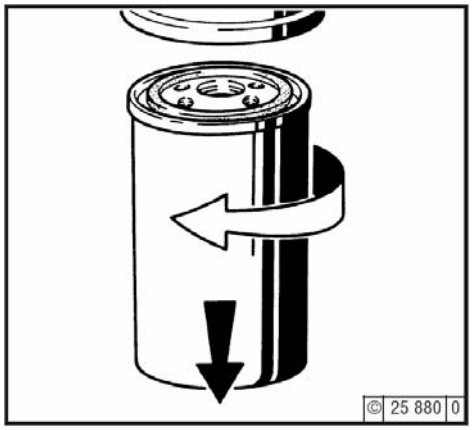
The following section provides information about the maintenance of the fuel system.

NOTE: The fuel system does not have to be bled, but there is a manual hand pump built into the fuel lift pump. This hand pump can be used to prime the system and reduce starter engagement time.

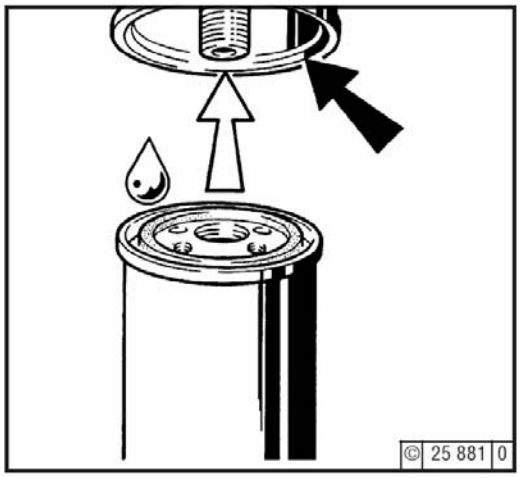
6.2.1. Replacing the Fuel Filter

Keep open flames away when working on the fuel system.

Do not smoke!



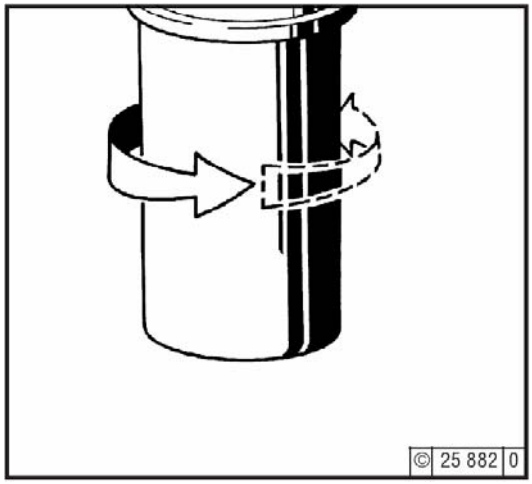
1. Close the fuel shut-off valve
2. Unscrew the fuel filter cartridge using a commercial tool and spin it off.
3. Catch any fuel that may spill out.



4. Clean any dirt from the filter carrier sealing surface

5. Apply a light film of oil or diesel fuel to the rubber gasket of new fuel filter cartridge.

6. Manually screw in the new cartridge until the gasket is flush.



7. Tighten the fuel filter cartridge with another half-turn by hand

8. Open the fuel shut-off valve

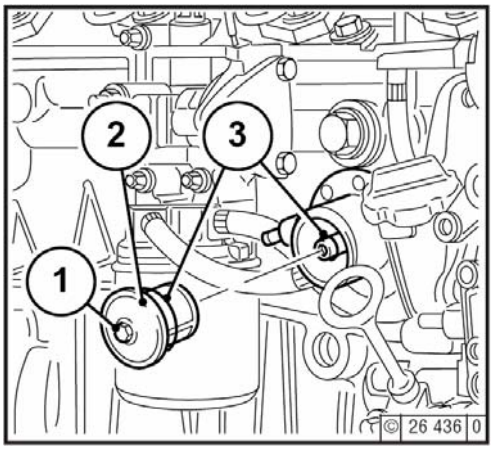
9. Check for leaks

6.2.2. Cleaning the Fuel Filter Strainer

Keep open flames away when working on the fuel system.

Do not smoke!

Please follow the steps below to properly clean the fuel strainer:



1. Close the fuel shut-off valve
2. Loosen and unscrew the hexagonal nut **1**
3. Remove the fuel strainer cover **2** (the cover and strainer are one unit)
4. Clean the fuel strainer **2** with diesel fuel. Replace with a new part if necessary
5. Place seal **3** into position
6. Mount the fuel strainer cover **2**
7. Tighten the hexagonal screw **1**
8. Check for leaks

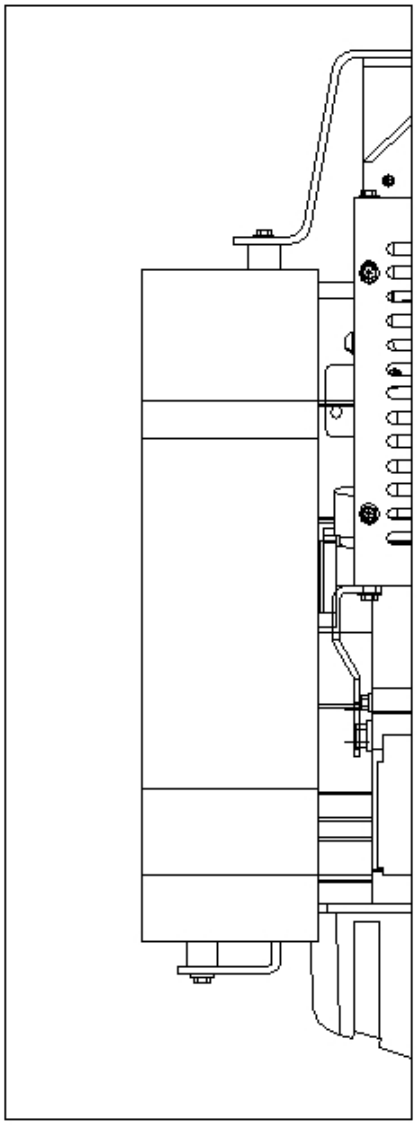
6.3. Belt Drives

The following section contains information about your engine belts

6.3.1. Belt Cover

DO NOT operate the engine without the Belt Cover secured in place.

The drawing below illustrates the belt cover secured properly in place.



6.3.2. Checking the V-belt

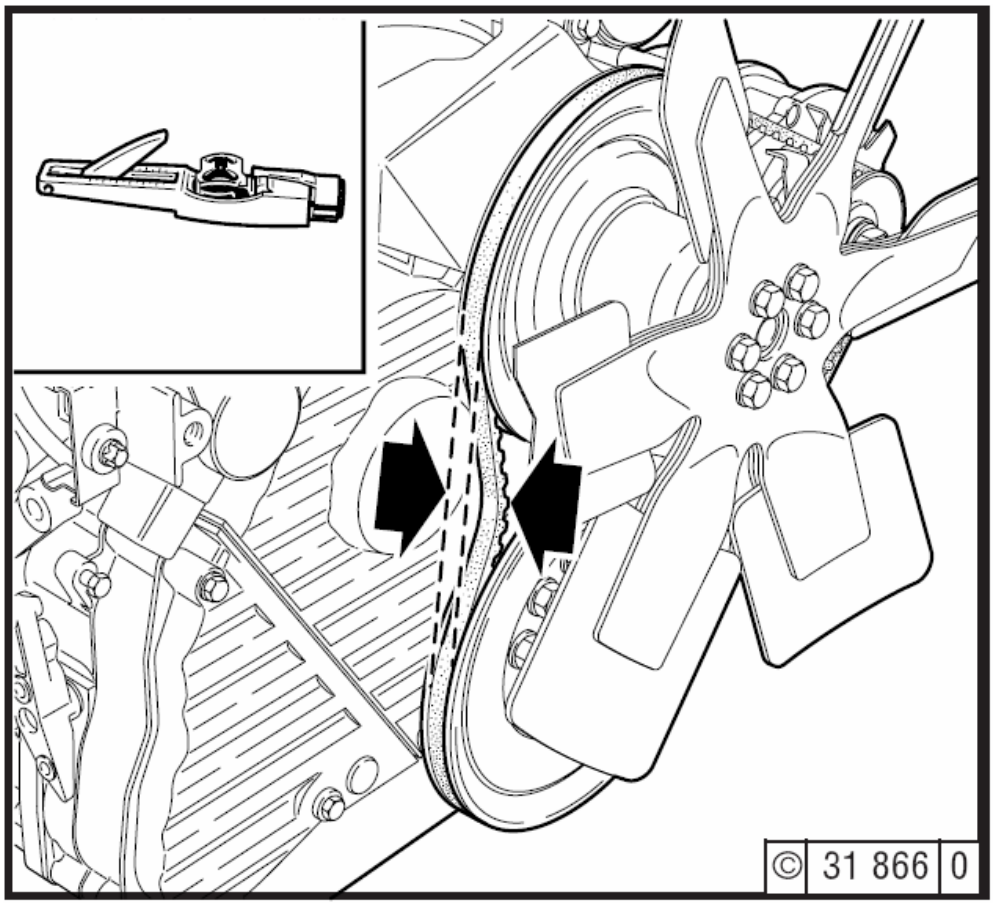
Check the tension and change belts with the engine **OFF.**

Reinstall the belt guard **before** restarting the engine.

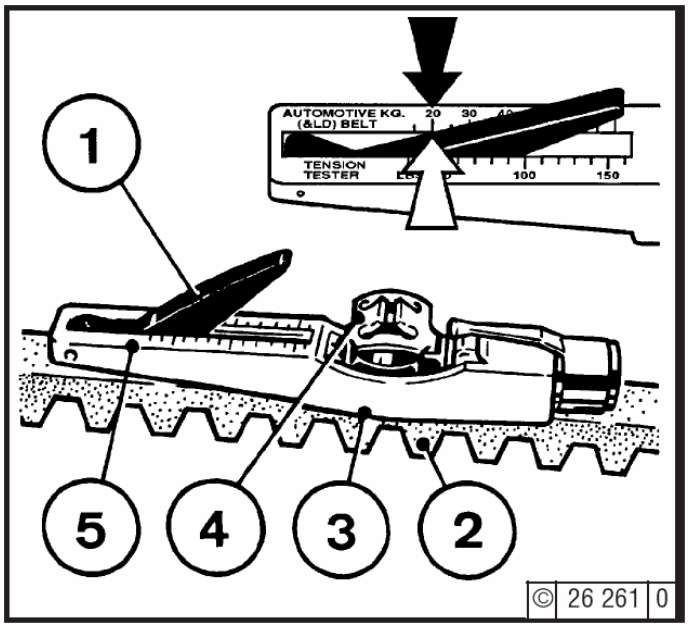
Please follow the steps below to check the V-belt.

NOTE 1: Use a tension gauge to check the belt (see section 8.3)

NOTE 2: After installing new belts, run the engine for 15 minutes and then check the belt tension again.

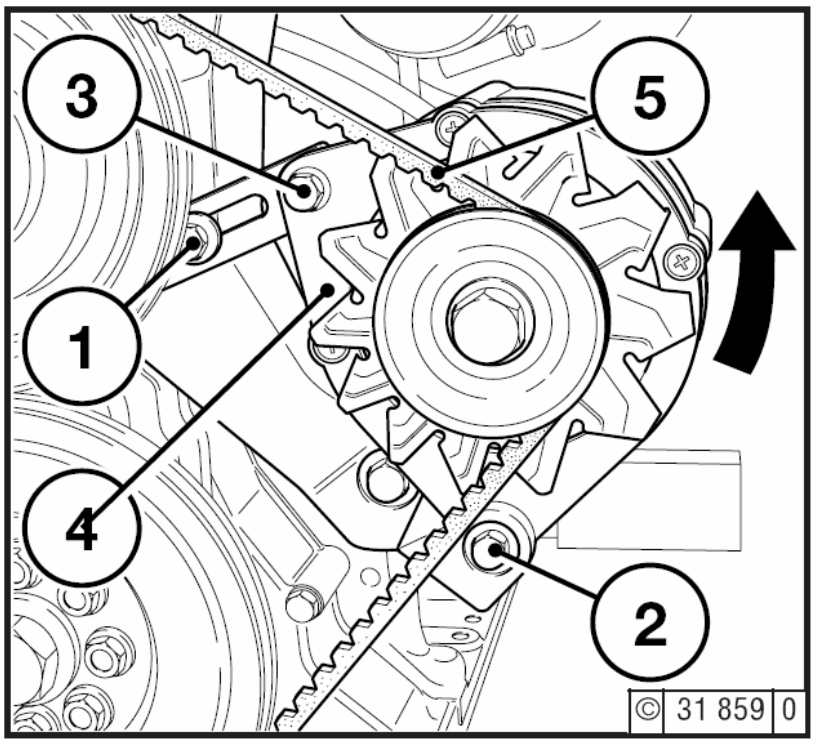


1. Visually inspect the entire V-belt for damage
2. Replace damaged V-belts
3. After installing new belts, turn on the engine and let it run for about 15 minutes
4. Turn off the engine and check the belt tension



5. Place the indicator arm (**1)** into the gage
6. Position the guide (**3)** on the V-belt (**2)**, midway between pulleys, with the stop against the edge of the belt
7. Push slowly on the black pad (**4)** at right angles toward the V-belt (**2)** until the spring is heard or is felt being triggered.
8. Carefully remove the gauge without altering the position of the indicator arm (**1)**
9. Read off the value on the gauge where the black indicator arm (**1)** intersects with the scale (**5)**. For settings see section 9.1
10. If necessary, pretension the belt and measure again

6.3.3. Tensioning the Alternator Belt(s)



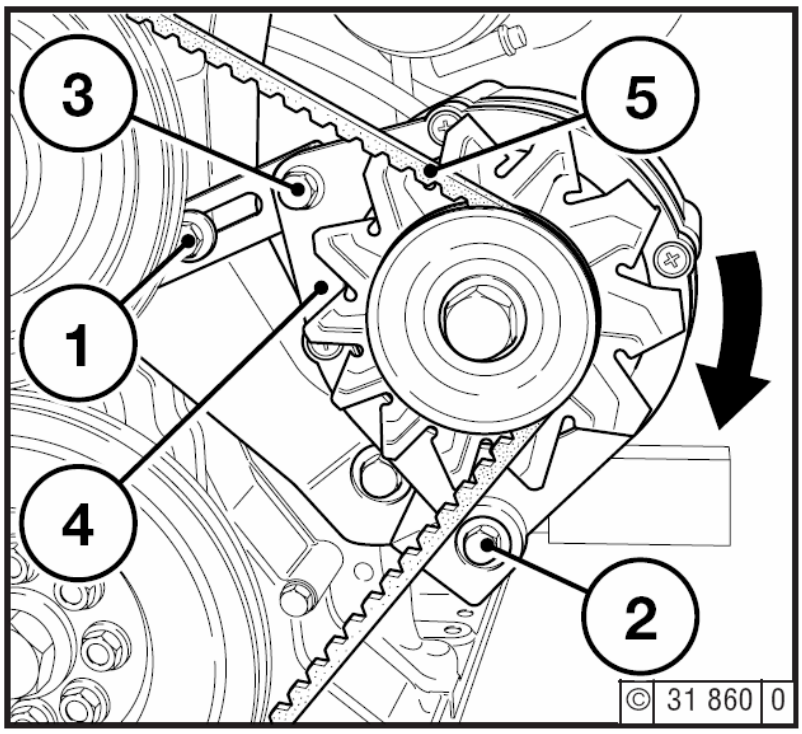
Follow these steps to properly tension the engines' alternator belt:

1. Loosen the bolts labeled (**1)**, (**2)** and (**3)** in the above diagram
2. Adjust the alternator labeled (**4)** in the direction of the arrow by turning bolt (**3**) until the correct belt tension is achieved.
3. Then retighten bolts (**1)**, (**2)** and (**3)**

6.3.4. Changing the Alternator Belt(s)

Check the tension and change belts only with the engine OFF.

Reinstall the belt guard before running the engine.



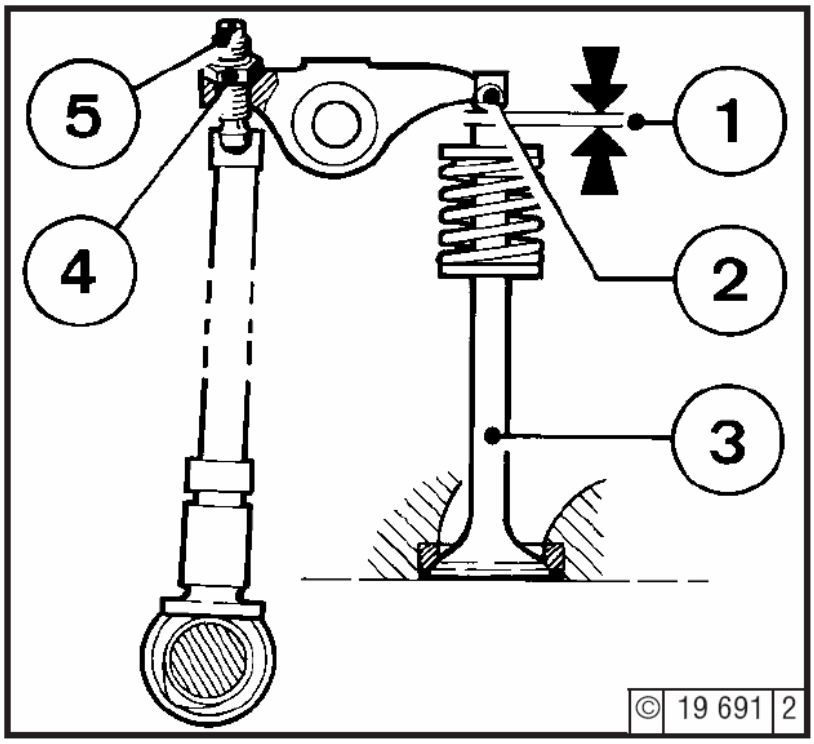
Please follow the steps below, using the above diagram as a reference, to properly change the engine's alternator belt:

1. Loosen bolts (**1**), (**2**) and (**3**)
2. Adjust the alternator (**4**) in the direction indicated by the arrow by turning bolt (**3**)
3. Remove and replace the belt
4. Adjust the alternator (**4**) in the direction of the arrow by turning bolt (**3**) until the correct tension is obtained
5. Then retighten bolts (**1**), (**2**) and (**3**)

6.4. Adjustments

The following section contains information on adjustments that should be made to your engine at given service and maintenance periods.

6.4.1. Checking the Valve Clearance



Using the above diagram, please follow the steps below to adjust your engines valve clearance:

1. Remove the valve cover

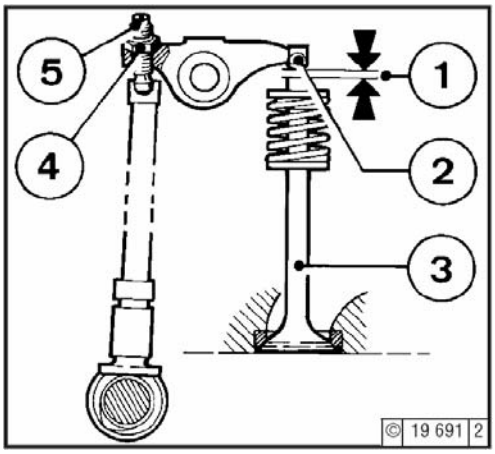
2. Position the crankshaft as directed by the schematic in section 6.4.2.1.

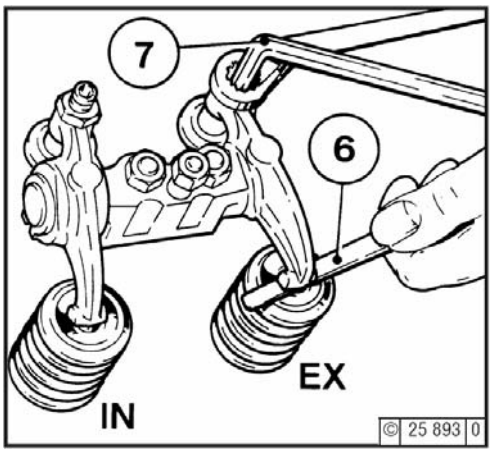
3. Before adjusting the valve clearance, allow the engine to cool down for at least 30 minutes. The oil temperature should be below 80 degrees C

4. Check the valve clearance labeled (**1**) between the rocker arm / tappet contact face (**2**) and valve stem (**3**) with a feeler gage (**6)** (see diagram below).

NOTE: There should only be a slight amount of resistance when the feeler gage is inserted. See section 8.1 for the permissible valve clearance.

6.4.2. Adjusting the Valve Clearance

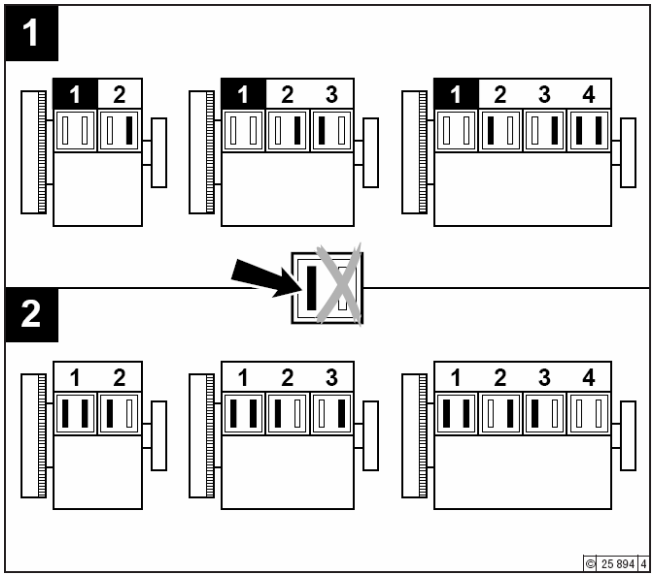




Use the above diagram(s) and the steps below to properly adjust the valve clearance.

1. Release locknut (**4**)
2. Use an Allen key (**7**) to turn the set screw (**5**) so that the correct clearance is attained after locknut (**4**) has been tightened.
3. Check and adjust the valve clearance on all cylinders.
4. Reinstall the valve cover, with a new gasket, if necessary.

6.4.2.1. Valve Clearance Adjustment Schematic



Crankshaft Position 1:
Turn the crankshaft until both valves in cylinder 1 overlap (with the exhaust valve about to close and the inlet valve about to open). Adjust the clearance of the valves (**marked in black**) on the schematic. After adjusting each rocker arm, mark them with chalk to indicate that they have been adjusted.

Crankshaft Position 2:
Turn the crankshaft one full revolution (360 degrees). Then adjust the clearance of the valves (**marked in black**) indicated on the schematic.

6.5. Maintenance of Accessories

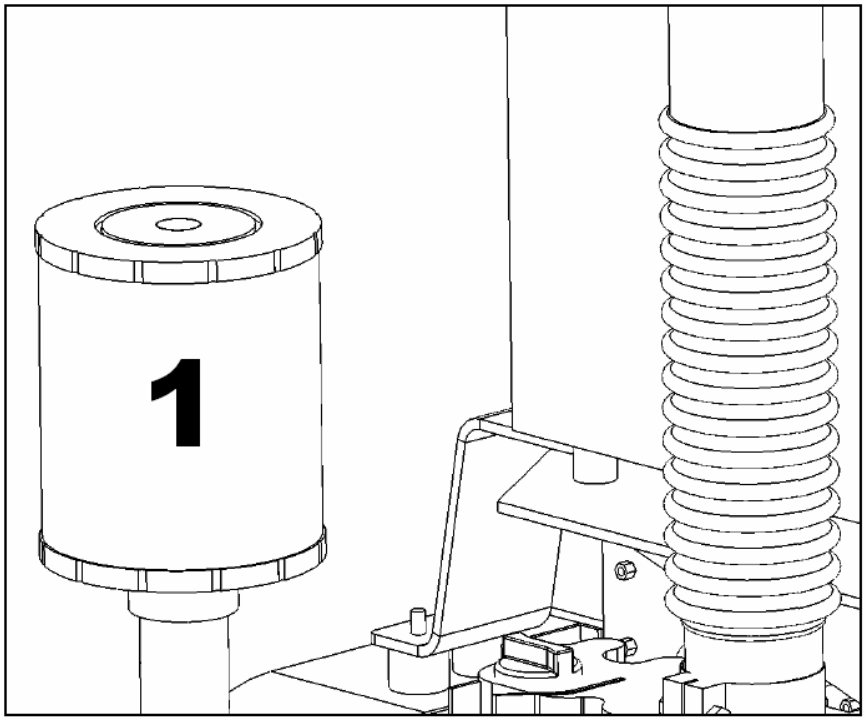
The following section describes the service and maintenance of your engine's accessories.

6.5.1. Air Cleaner

DO NOT attempt to open or disassemble the air filter

NO maintenance of any kind is to be done with the **disposable** air filter that is supplied with the engine. The filter is to be removed and a new one installed in its place. Please see section 9 entitled *"Tools and Parts"* for the correct part number when ordering a new air filter.

1. Remove the air filter **1** by loosening the clamp beneath it.



2. Then install the new filter and tighten the clamp to prevent it from becoming loose.

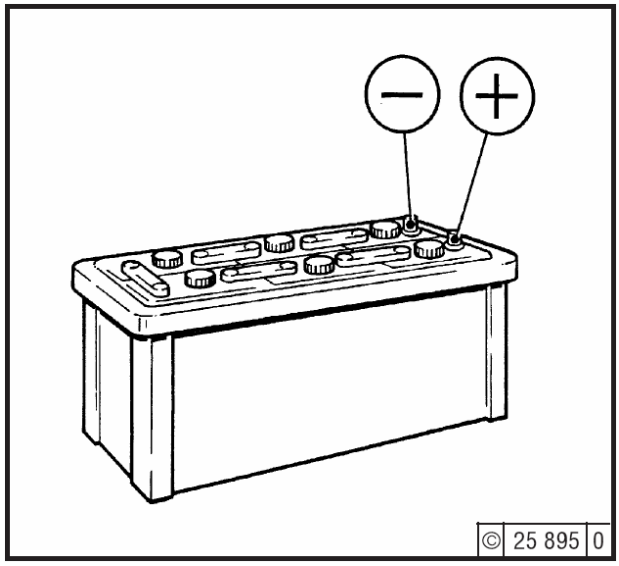
6.5.2. Battery

The following sections describe the service and maintenance of your engines' battery.

NOTE: 12V units have 2 batteries
24 V units have 4 batteries

Only use **8D** size batteries with the engine. For other questions regarding engine batteries please contact the DEUTZ service department.

6.5.2.1. Checking the Battery and Connectors



Use the above diagram and the steps below to check the battery and its connectors.

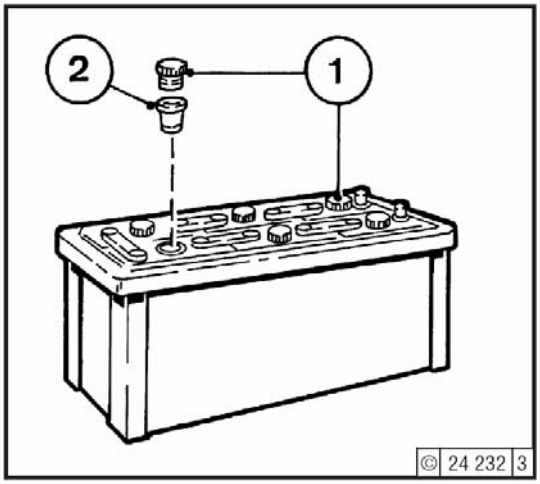
1. Keep the battery clean and dry
2. Loosen the clamp bolts and remove them from the battery posts
3. Clean the terminal posts (+ and -) and clamps.
4. Grease the posts with acid-free and acid resistant grease.
5. Place the clamps back onto the posts (ensure good contact with the posts)
6. Tighten the clamp bolts so they are hand tight

6.5.2.2. Checking the Electrolyte Level

- The gases emitted by the battery are explosive! Keep sparks and open flames away from the battery!
- Do not allow battery acid to come in contact with skin or clothing!

- Wear protective goggles!
- Do not rest tools on the battery!

Please follow the steps below to check the electrolyte level in the battery.



For batteries with testers:

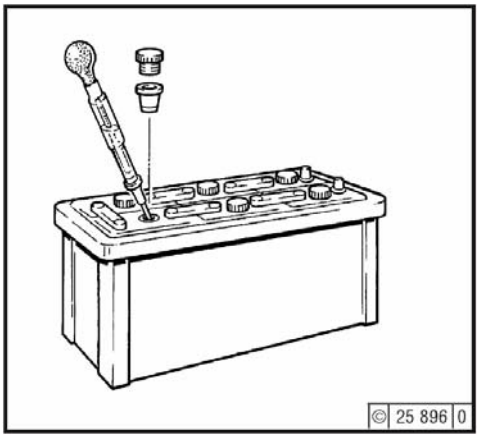
1. Remove the sealing caps (**1**)
2. Check to see if the electrolyte level reaches the bottom surface of the tester (**2**)
3. If necessary top off the battery with **distilled water**
4. Put the tester back into place
5. Screw the sealing caps back into place

For batteries without testers:

1. Remove the sealing caps (**1**)
2. The electrolyte should be 10 to 15mm above the top of the plates
3. If necessary top off the battery with **distilled water**
4. Screw the sealing caps back into place

6.5.2.3. Checking the Electrolyte Density

- Measure the density of the electrolyte in each of the cells using a commercial hydrometer.
- The hydrometer reading indicates the battery's state of charge.
- The temperature of the electrolyte should be +20°C (68°F) when taking the measurement.



The following chart is used to determine the charge status of the battery based on the electrolyte density.

Electrolyte Density				
in [kg/l]		in [Be' (Baume' scale)*		Charge status
Normal	Tropical	Normal	Tropical	
1.28	1.23	32	27	well charged
1.2	1.12	24	16	semi-charged, re-charge
1.12	1.08	16	11	dis-charged, immediately charge

* NOTE: The Baume' scale is out of date and is rarely used today.

6.5.3. Alternator

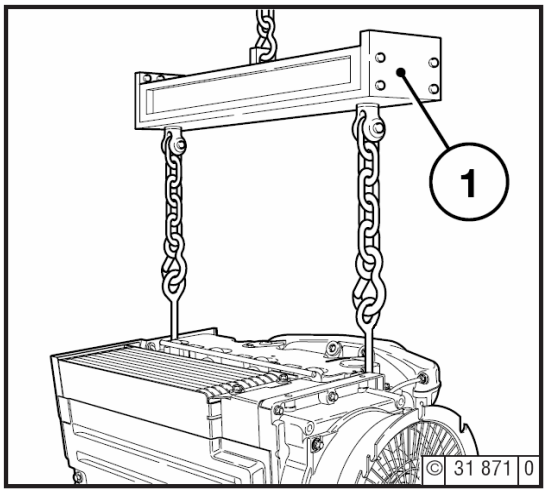
Notes on the three phase system:

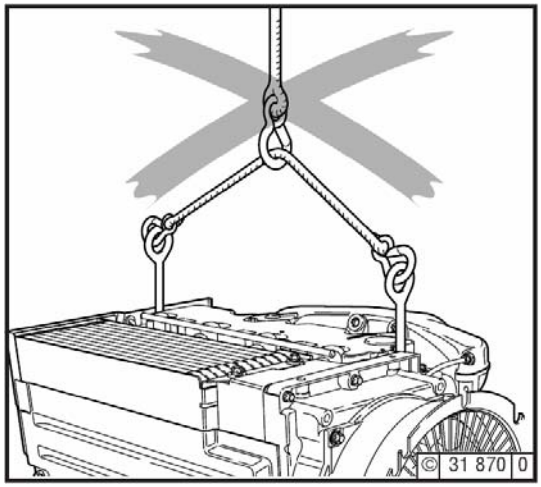
- Never disconnect cables between the battery, alternator and regulator while the engine is running.
- However, if it's necessary to start and operate the engine without a battery then disconnect the regulator from the alternator before starting.
- Be sure not to confuse the battery terminals (e.g. positive "+" and negative "-")
- Replace a defective charge pilot lamp bulb immediately
- Cover up the alternator and regulator before washing the engine
- Do not touch live leads against the frame if you have a motor with a three phase electrical system.
- In the case of electric welding, connect the welder grounding cables directly to the work piece being welded.

6.5.4. Transportation Shackles

Follow the guidelines below to transport your engine safely

Always use the proper lifting tackle (**1**) when transporting the engine.





6.6. Engine Cleaning

The following section contains guidelines for cleaning your engine.

6.6.1. Cleaning the Engine

Turn the engine **OFF** before cleaning.

Preparation:

1. Switch off the engine
2. Remove the engine covers (replace them after cleaning)
3. Cover the electrical / electronic components and connectors (e.g. alternator, starter, governor and solenoid)
4. Clean with compressed air to dislodge loose particles

Cleaning with a cold-cleaning solution:

1. Spray the engine with a commercial cold-cleaning solution and allow it to react for approximately 10 minutes.
2. Spray the engine clean with a strong water jet, repeat if necessary.
3. Allow the engine to run warm so the remaining water can evaporate.

Cleaning with a high-pressure devise:

1. Clean the engine with a jet stream (max spray pressure of 60 bar or 870 psi), max temperature of 90°C or 194°F).
2. Allow the engine to run warm so that remaining water evaporates.

7. Faults, Causes and Remedies

The following section contains information that will help with the diagnoses of common problems that could occur with your engine.

NOTE:

- Faults are often caused by the engine not being properly operated or maintained.
- Each time a fault occurs, check whether all operating and servicing regulations have been followed.
- If you cannot find and fix a problem, please contact DEUTZ SERVICE.

7.1. Fault Tables

Use the table(s) on the following page to diagnose and correct common problems that could occur with your engine.

Engine does not start or is difficult to start	Engine starts, but runs irregularly or fails	Engine becomes excessively hot. Temperature warning system responds	Engine output is below normal	Engine does not run on all cylinders	Engine oil pressure is below normal	Engine oil consumption is excessive	Engine smokes: Blue	White	Black	**Cause**	**Section**	**Recommended Action**
												Check **Ch**
												Adjust **A**
												Replace **Rp**
												Clean **Cl**
												Top off **T**
												Reduce **Rd**
●										Engine drive shaft and/or connection to water pump is jammed	Engine Operation	**Ch**
●								●		Below starting limit temperature		**Ch**
		●			●					Oil level too low		**T**
		●	●			●	●			Oil level to high		**Ch**
●					●					Incorrect lube oil SAE class or quality	Operating Media	**Rp**
●	●		●					●		Fuel quality not as per operating manual		**Rp**
		●	●						●	Air cleaner clogged / turbocharger defective	Combustion Air	**Ch / Rp**
			●						●	Turbo hose / pipe leaking		**Ch**
		●								Cooling water not flowing thru cooler	Cooling System	**Ch / Rp**
		●								Raw water temperature too high		**Ch**
		●								Resistance in cooling system too great / through flow quantity too small		**Ch**
●										Battery defective or discharged	Electrics	**Ch / T**
●										Cable connections, starter, electrical circuit loose or oxidized		**Ch**
●										Starter defective or pinion does not engage		**Ch**
●	●		●					●	●	Incorrect valve clearance	Engine	**A**
	●		●	●						Incorrect valve leaks		**Ch**
●	●	●	●	●				●	●	Injector defective		**Ch / Rp**

8. Technical Specifications

This section provides technical information about your engine.

8.1. Engine Specifications and Settings

The following section contains technical data for the following engine(s):

- **DFP4-2011-T20**
- **DFP4-2011-T10**

DFP4-2011-T20

General		
Cylinders	4	
Cylinder arrangement	Vertical in-line	
Bore	94 mm	3.7 in
Stroke	112mm	4.4 in
Cylinder Displacement	0.777 liter	47.4 in³
Total displacement	3.108 liter	189.6 in³
Compression ratio	17.5 : 1	
Combustion system	Direct injection	
Aspiration	Turbocharged	

Fuel System		
Lift pump suction head, max	1.5m	60 in
Lift pump flow @ max rpm	53.1/h	14.0 GPH
Max restriction in fuel supply line	300 mbar	120 in. H2O
Max restriction in fuel return line	200 mbar	80 in. H2O
Max restriction in fuel pre-filter	200 mbar	80 in. H2O
Fuel filter type	Replaceable cartridge	

Combustion Air System		
Combustion air flow @ max rating	370.0m³/h	217.7 CFM
Max allowable clean restriction	50 mbar	20 in. H2O
Max allowable dirty restriction	65 mbar	26 in. H2O

Exhaust System		
Exhaust gas flow @ max rating	965.0 m³/h	567.9 CFM
Exhaust temp @ max rating	620°C	1148°F
Max allowable back pressure	75.0 mbar	30 in. H2O

Cooling System		
Type	External oil coolng	
Coolant heat rejection % of gross power	63%	
Max coolant temp @ engine outlet	140°C	284°F
Max coolant operating pressure	7 bar	101.5 psi
Lubrication type	Forced-feed lubrication	
Oil flow at max rpm	40.0 l/min	10.6 GPM

Lubrication System		
Lubrication type	Forced-feed lubrication	
Oil flow at max rpm	40.0 l/min	10.6 GPM
Filter volume	0.4 liter	0.423 qt

Electrical		
Starter motor	12V, 2.3kw	24V, 4.0 kw
Voltage drop, battery (+), max	1.0V	

Physical Data		
Length	718 mm	28.3 in
Width	553 mm	21.8 in
Height	703 mm	27.7 in
Weight, dry	247kg	543.4 lb
Max bending @ housing	900 Nm	663.3 lb-ft
Max force @ flywheel:		
Axial	1500 N	337.8 lb
Radial	3700 N	833.3 lb

Certified Gross Power							
Engine RPM	**1470**	**1760**	**2100**	**2350**	**2650**	**2800**	**3000**
Kw	38	51	53	54	59	60	61
Hp	51	69	71	72	78	81	81

Certified Fuel Consumption							
g/kw-hr	260	255	231	236	249	253	275
lb/hp-hr	0.427	0.418	0.379	0.388	0.408	0.416	0.452
Liters/hr	11.6	15.4	14.4	15.1	17.0	18.0	19.8
Gal/hr	3.1	4.1	3.8	4.0	4.5	4.8	5.2

Combustion Air							
m³/h	160	200	265	300	350	390	425
CFM	94	118	156	177	206	230	250

Exhaust Gas							
m³/h	450	550	730	850	970	1075	1170
CFM	265	324	430	500	571	633	689

Raw Water Flow							
Water Temp:	**GPM**						
60°F	9	9	9	10	13	14	16
90°F	11	11	11	12	15	16	18

Heat Rejection to Coolant							
kW	22.6	30	31.8	33.5	36.6	38	39.5
BTU/min	1285	1705	1809	1904	2080	2161	2247

Certifications
U.S. EPA Non Road Tier 2
European COM 2 (37-75kW)

General		
Cylinders	4	
Cylinder arrangement	Vertical in-line	
Bore	94 mm	3.7 in
Stroke	112mm	4.4 in
Cylinder Displacement	0.777 liter	47.4 in³
Total displacement	3.108 liter	189.6 in³
Compression ratio	17.5 : 1	
Combustion system	Direct injection	
Aspiration	Turbocharged	

Fuel System		
Lift pump suction head, max	1.5m	60 in
Lift pump flow @ max rpm	53.1/h	14.0 GPH
Max restriction in fuel supply line	300 mbar	120 in. H2O
Max restriction in fuel return line	200 mbar	80 in. H2O
Max restriction in fuel pre-filter	200 mbar	80 in. H2O
Fuel filter type	Replaceable cartridge	

Combustion Air System		
Combustion air flow @ max rating	370.0m³/h	217.7 CFM
Max allowable clean restriction	50 mbar	20 in. H2O
Max allowable dirty restriction	65 mbar	26 in. H2O

Exhaust System		
Exhaust gas flow @ max rating	965.0 m³/h	567.9 CFM
Exhaust temp @ max rating	620°C	1148°F
Max allowable back pressure	75.0 mbar	30 in. H2O

Cooling System		
Type	External oil coolng	
Coolant heat rejection % of gross power	63%	
Max coolant temp @ engine outlet	140°C	284°F
Max coolant operating pressure	7 bar	101.5 psi
Lubrication type	Forced-feed lubrication	
Oil flow at max rpm	40.0 l/min	10.6 GPM

Lubrication System		
Lubrication type	Forced-feed lubrication	
Oil flow at max rpm	40.0 l/min	10.6 GPM
Filter volume	0.4 liter	0.423 qt

Electrical		
Starter motor	12V, 2.3kw	24V, 4.0 kw
Voltage drop, battery (+), max	1.0V	

Physical Data		
Length	718 mm	28.3 in
Width	553 mm	21.8 in
Height	703 mm	27.7 in
Weight, dry	247kg	543.4 lb
Max bending @ housing	900 Nm	663.3 lb-ft
Max force @ flywheel:		
Axial	1500 N	337.8 lb
Radial	3700 N	833.3 lb

Certified Gross Power						
Engine RPM	**1760**	**2100**	**2350**	**2650**	**2800**	**3000**
Kw	34	41	45	45	54	54
Hp	45	55	60	60	72	72

Certified Fuel Consumption						
g/kw-hr	255	231	236	249	253	275
lb/hp-hr	0.418	0.379	0.388	0.408	0.416	0.452
Liters/hr	10.1	11.1	12.6	13.1	16.0	17.6
Gal/hr	2.7	2.9	3.3	3.5	4.2	4.7

Combustion Air						
m³/h	200	265	300	350	390	425
CFM	118	156	177	206	230	250

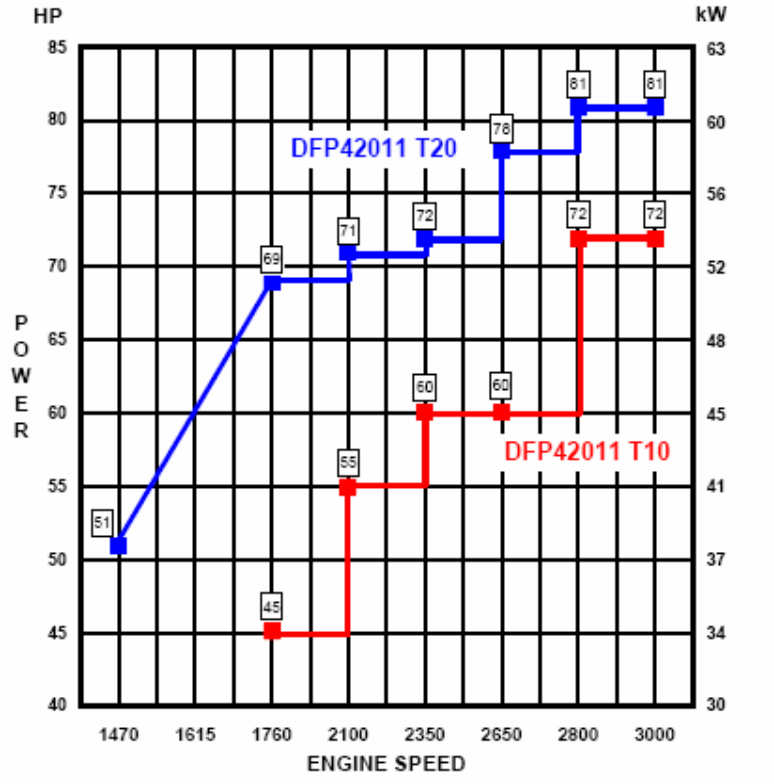
Exhaust Gas						
m³/h	550	730	850	970	1075	1170
CFM	324	430	500	571	633	689

Raw Water Flow						
Water Temp:	**GPM**					
60°F	7	7	9	10	13	14
90°F	9	9	11	12	14	16

Heat Rejection to Coolant						
kW	19.7	23.5	26	27	33	34
BTU/min	1120	1337	1479	1536	1877	1935

Certifications
U.S. EPA Non Road Tier 2
European COM 2 (37-75kW)

8.1.1. Power Curves



8.2. Oil Volumes

Oil Volumes	
Initial Fill Volume	**Oil Change Volume (with filter)**
Liters / Quarts	Liters / Quarts
12 / 12.7	10.4 / 11.0

8.3. Torque Wrench Settings

Please use the chart below to properly tighten the various fasteners on your engine.

Installation location	Total [Nm]	Comments
valve cover	8.5	
Rocker arm adjustment screw	21	
Mounting Foot	106	
Air Intake Pipe	21	
Exhaust Manifold	22	
Oil drain plug	55	
Oil pan	21	
Injection line attachment	30	
Injection attachment	21	TORX
Lube Oil Filter Cartridge	27	
Fuel Filter Cartridge	27	

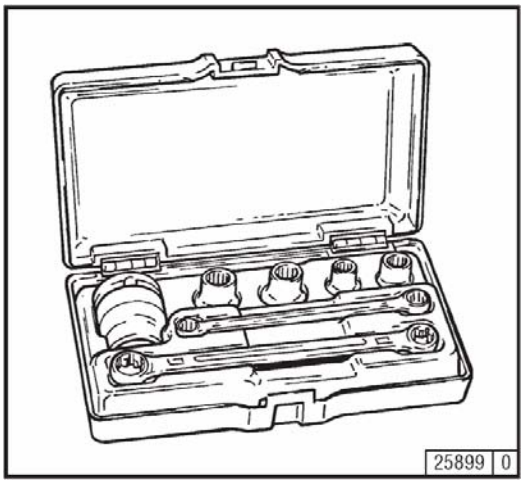
9. Tools and Parts

9.1. Spare Parts List

DEUTZ Part #	Vendor Part #	Part Description
117-4416	NA	oil filter
117-4482	NA	fuel filter with water separator
134-0488	NA	fuel pre-filter (in fuel lift pump)
117-9565	NA	v-belt
030-0484	D065003	air filter
118-2151	NA	12V alternator
118-2382	NA	12V starter
428-7121	NA	12V shutdown solenoid
118-2153	NA	24V alternator
118-2390	NA	24V starter
428-7122	NA	24V shutdown solenoid
		Fuel Injection System:
428-6257	NA	a. Injector
428-6967	NA	b. Injection Pump
428-1876	NA	c. High Pressure Pipe
428-7258	NA	d. Fuel Lift Pump
428-1429	NA	e. Low Pressure Return Pipe
428-6917	NA	f. Low Pressure Supply Pipe
030-5299	NA	Stub Shaft
417-9928		Thermostat
		Cooling System:
030-3687	36631762	a. Oil Cooler Hose (Qty 2x)
030-0482		b. Water Flex Connector
030-3153	3500047	c. Oil Pan Heater (120V)
030-XXXX		d. Oil Pan Heater (240V)
030-4890	EKS-518-201503	e. Oil Cooler
118-2482	NA	Oil Pressure Switch
118-2876	NA	Oil Temperature Switch
428-1437	NA	Turbocharger
		Speed Control
030-0492	ESSE-2	Crank Termination / Over Speed Switch
030-0477		Control Panel & Instruments
NA		Batteries
		Governor Spring For Engine Running at:
417-4542	NA	a. 3000 and 2800 RPM
427-2765	NA	b. 2650 RPM
417-4821	NA	c. 2350 RPM
428-6928	NA	d. 2100 RPM
427-0946	NA	e. 1760 and 1470 RPM

9.2. Tools

TORX

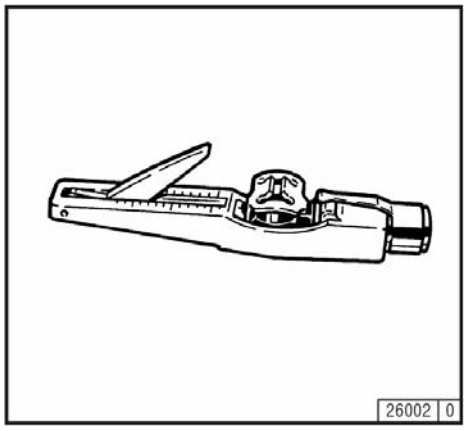


A TORX BN. 8189 screw set is used with engines in the 2011 series. This system was chosen because of the many advantages it offers:

- Outstanding accessibility to bolts
- High load transfer when loosening and tightening
- Almost impossible for the socket to slide off or break, thereby practically ruling out the risk of injury.

TORX tools can be ordered from DEUTZ.

V-belt tension gage



The V-belt tension gauge can be obtained under order number 8115 from DEUTZ.

10. Service

This section provides information about servicing and parts.

10.1. Knowing it's DEUTZ

DEUTZ has always stood for excellence in motor construction, pioneering many developments in the industry. As an independent motor manufacturer, we offer – world wide – a comprehensive range of diesel and gas motors ranging from 4kW to 7,400kW. Our products are tailored to meet our customers' requirements.

Over 1.4 million reliable DEUTZ motors are in use world wide. We are determined to preserving the high standard of performance and reliability of our motors. DEUTZ is represented worldwide through a network of service partners who will meet the needs of our customers, regardless of their location.

This Sales and Service index (pictured below) provides you with an overview of the DEUTZ partners in your area, including the parts and services that they offer. Your DEUTZ partner will be happy to help you even when no direct product responsibility is mentioned.

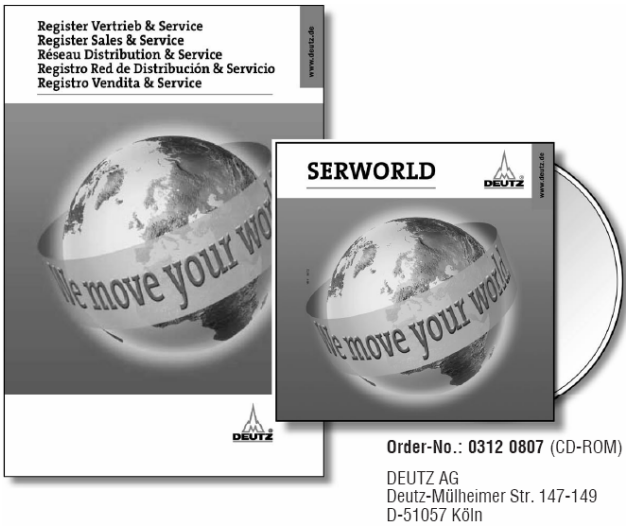
This index is constantly updated. Please ask your DEUTZ service partner for the latest edition or visit our website for more information:

On the web at:
http://www.deutz.com

Deutz Corp.
3883 Steve Reynolds Blvd.
Norcross, Ga, 30093
Phone: (770) 564-7100

OR

DEUTZ AG
Ottostrasse 1
D-51149 Koln (Porz)
Entwicklungszentrum
Phone: 0049-221-822-0
Telefax: 0049-221-822-5304
Telex: 8812-0-khd d



DEUTZ AG – at your service.

CALIFORNIA PROPOSITION 65 INFORMATION

TO CALIFORNIA CUSTOMERS AND TO CUSTOMERS SELLING DIESEL ENGINE EQUIPMENT INTO OR FOR USE IN CALIFORNIA.

Proposition 65, a California law, requires warnings on products which expose individuals in California to chemicals listed under that law, including certain chemicals in diesel engine exhaust.

Obligations of Manufactures of Diesel-Powered Off-Road Equipment. The California Superior Court has approved either of the following two methods of compliance with Proposition 65 requirements by manufactures of off-road equipment containing diesel engines. (The court order containing these provisions is attached.)

1. **On-Equipment Warning.** Place the warning pictured in attachment 1 on all equipment shipped by you into or for sale in California after January 1, 1996. The warning must be in a location where it is easily visible to the operator of the equipment when (s)he is operating the equipment. The warning must be secured to the equipment. If warnings or operating instructions are provided through a digital display, you may usee that method of providing warning.
2. **Operator Manual Warning.** When the operator manual is next revised or by December 31, 1995 whichever is earlier, place the warning in attachment 2 in the operator manual. The warning may be either printed in the manual or on a sticker.

The warning must appear in one of the following locations:

- Inside The front cover
- Inside the back cover
- Outside the front cover
- Outside the back cover
- As the first page of text

Under either alternative, the warning must appear in the same size, print and format as the attachment selected or be of an equally conspicuous size and format. If the warning is provided in an on-screen display, the warning must contain the language in the attachment and must be provided at the time of or in connection with ignition in the same manner as other safety warnings electronically communicated on screen.

Obligation of Resellers of Diesel Engines. This letter must accompany any loose diesel engine sold in California.
Should you have any questions, please call Deutz Corporation Product Support Department.

11. Notes

Warnings to be placed on equipment:

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Warnings in the Manual:

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Or

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Appendix A:
Fire Pump Layout Schematic

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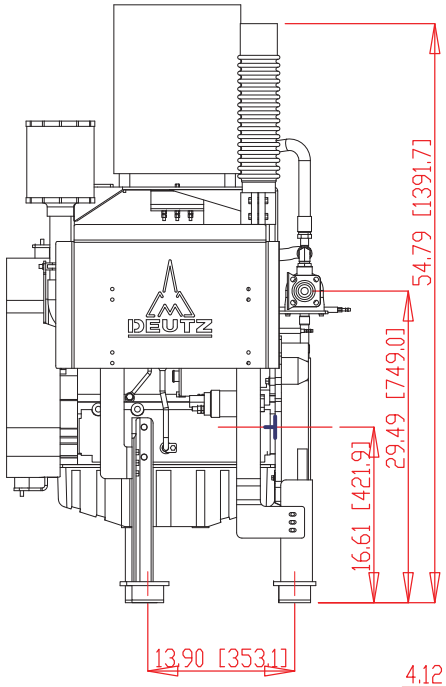

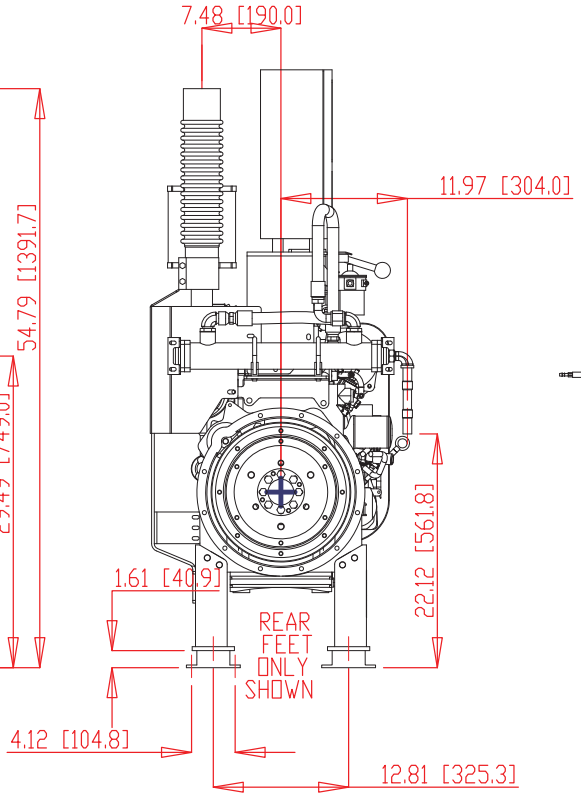

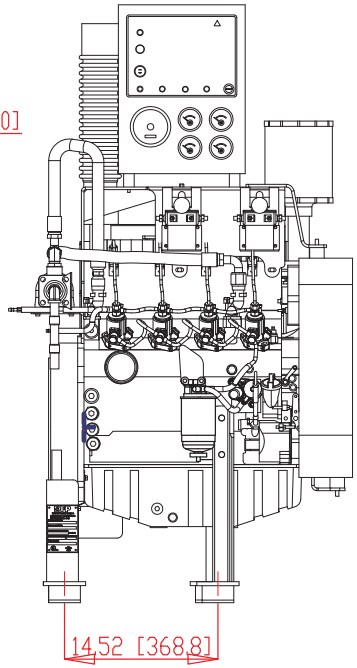

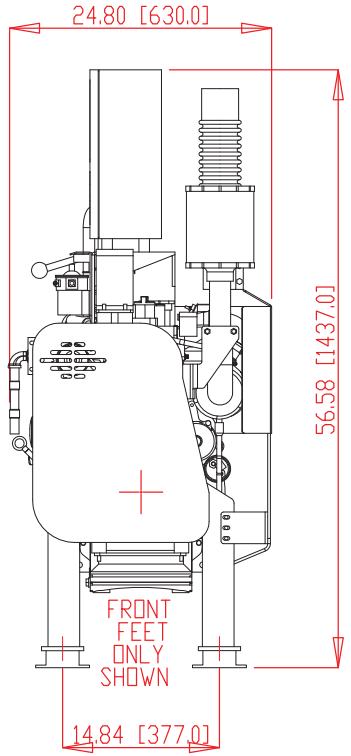

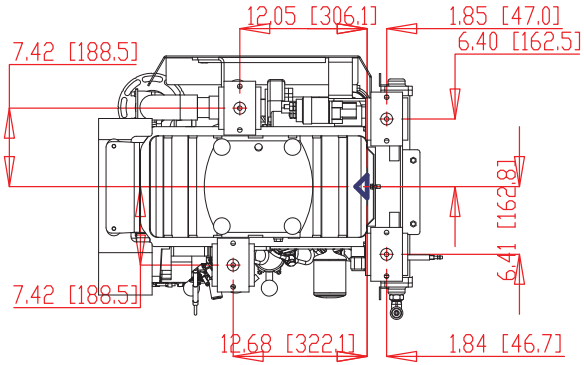

NOTE:
VERTICAL DIMENSIONS
INCLUDE ISOLATORS

NOTES:
1. *FEET ISOLATORS SHIPPED LOOSE W/ HARDWARE.*
2. *USE ONLY APPROVED LIFTING GEAR.*
3. *SEE ALSO " DC1190" LAYOUT DRAWING.*

DEVELOPMENT
Release
09/20/07
ECN# 90-00123

UNLESS OTHERWISE SPECIFIED

ASSY	DFP-2011-4
PAS 09/17/07	
A 90-00123	
TITLE	DFP-2011 LAYOUT
DRAWING	DC1193
REVISION	DATE BY

Appendix B:
Standard Equipment, Engine Construction and Materials list

Item	Description	Details
BASIC CONFIGURATION		Inline 4 Cylinder, Direct Injection
MOUNTING	Type	Pedastal Feet with Rubber Isolators
Cooling and Lubrication (The lubrication system also serves as the cooling medium)		
HEAT EXCHANGER	Type	Oil to water, Shell to tube
LUBRICATION / COOLANT PUMP	Type Drive	Gear Rotor Toothed Timming Belt
LUBE OIL FILTER	Type	Spin-on 0.4L
ENGINE HEATER	Type	120V, 150 Watt Immersion Oil pan Heater
Fuel System		
FUEL PUMP	Type Drive	Piston Engine Camshaft
INJECTION PUMP	Type Drive	Unit pump (1 per cylinder) Engine Camshaft
INJECTOR	Type	5 Hole Nozzle
AIR CLEANER	Type	Dry Type, Disposable
FUEL FILTER	Type	Spin-on, 0.6L with water separator
Engine Components		
CYLINDER HEAD	Type Material	1 Piece Block Type Gray Cast Iron
CYLINDER BLOCK	Type Material	One Piece - Vertical Inline Grey Cast Iron
CAMSHAFT	Drive Material	Toothed Timing Belt and Pulley Steel with Bimetal Bearings
CRANKSHAFT	Material Balance	Nodular Cast Iron Integral Counterweights

Item	Description	Details
PISTON	Type	Re-entrant Bowl
	Material	Alluminum Alloy
ALTERNATOR	Type	Standard: 12V, 55 Amp Optional: 24V, 35 Amp
	Drive	Belt Drive
STARTER	Type	Standard: 12V, 2.3kw Optional: 24V, 4.0 kw
FLYWHEEL	Type	SAE 8/10 Industrial Over Center Clutch style
GOVERNOR	Type	Flyweight and Spring
THROTTLE CONTROL	Type	Factory pre-set for required speed and power
Engine Control Panel and Components		
INSTRUMENT PANEL	Type	Includes Tachometer, hourmeter, Oil Pressure gage, Coolant Temp gage, Dual Voltmeters, Overspeed Test and Reset switches, Dual Start Switches and Shutdown switch, Charge Indicator Light
RUN-STOP CONTROL	Type	Standard: 12V Energized to shutdown solenoid Optional: 24V Energized to shutdown solenoid
OVERSPEED CONTROL	Type	Woodward ESSE-1 with 67% overspeed test and starter lockout function.

Appendix C:
Fire Pump Connection Map

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CUSTOMER WIRING

TB1

W	1	2	3	4	5	6	7	8	9	10	11	12
	SOLENOID +	OVERSPEED SWITCH NO	OVERSPEED SWITCH NO	LOW PRESSURE SWITCH	HI TEMP SWITCH	BATTERY 1 +	BATTERY 2 +	STARTER 1 SIGNAL	STARTER 2 SIGNAL	GROUND	SHUTDOWN	

TO FIRE PUMP CONTROLLER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
LOW PRESSURE SWITCH	STOP SOLENOID	ALTENATOR D+	WATER SOLENOID VALVE +	WATER SOLENOID VALVE –	HI TEMP SWITCH	MAG PICKUP –	MAG PICKUP SHIELD	GROUND	TEMP SENDER	BATTERY 1 +	OIL PRESSURE SENDER	STARTER 1 SIGNAL		BATTERY 2 +		STARTER 2 SIGNAL	MAG PICKUP +	

19 PIN MATING CONNECTOR
DEUTSCH HDP26–24–19SN
MURPHY P/N: 00–00–2503

LOW PRESSURE SWITCH

STOP SOLENOID

ALTERNATOR
D+
B+

OIL PRES. SENDER

TEMP SENDER

MAG PICKUP
+
–

WATER SOLENOID VALVE

HI TEMP SWITCH

STARTER CONTACTOR 1

STARTER CONTACTOR 2

BATTERY 1
+ –

BATTERY 2
+ –

STARTER

SOL
+ 50

1. *"SEE ALSO 0300513"*

DEVELOPMENT
Release
06/18/07
ECN# 90-00123

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UNLESS OTHERWISE SPECIFIED

NO.	ECN	REVISION	DATE	BY

VENDOR FP – " ALL 12V "
PAS 06/18/07
A 90-00123
CONNECTION MAP
DC1191

Appendix D:
Fire Pump Wiring Schematic

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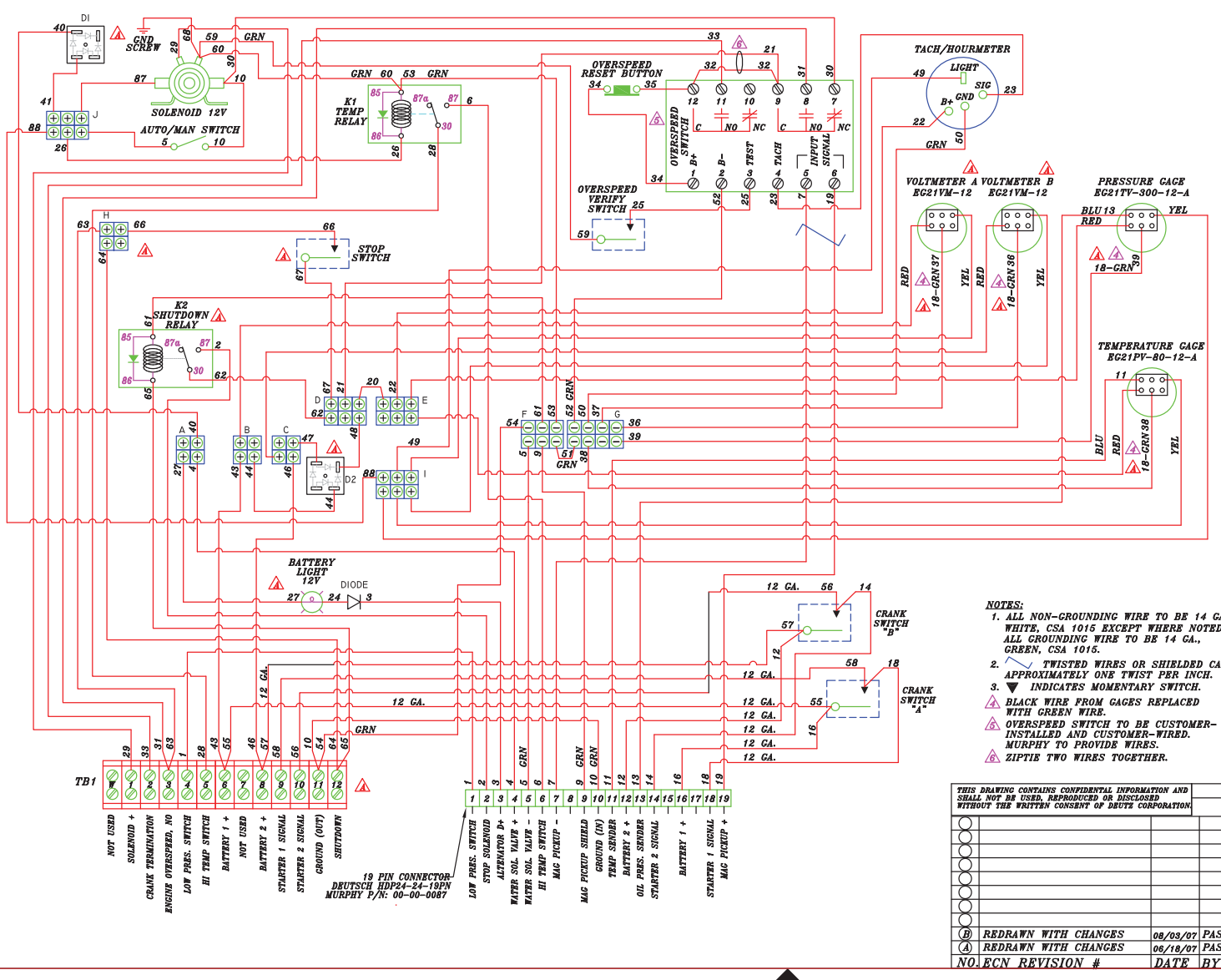

NOTES:

1. *ALL NON-GROUNDING WIRE TO BE 14 GA., WHITE, CSA 1015 EXCEPT WHERE NOTED. ALL GROUNDING WIRE TO BE 14 GA., GREEN, CSA 1015.*
2. *TWISTED WIRES OR SHIELDED CABLE. APPROXIMATELY ONE TWIST PER INCH.*
3. *▼ INDICATES MOMENTARY SWITCH.*
4. *BLACK WIRE FROM GAGES REPLACED WITH GREEN WIRE.*
5. *OVERSPEED SWITCH TO BE CUSTOMER-INSTALLED AND CUSTOMER-WIRED. MURPHY TO PROVIDE WIRES.*
6. *ZIPTIE TWO WIRES TOGETHER.*

DEVELOPMENT
Release
08/03/07
ECN# 90-00123

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UNLESS OTHERWISE SPECIFIED
CORNERS PER DIN 6784 | GEOMETRIC TOLERANCES PER ISO 1101 AND DIN 7167 | SURFACE TEXTURE PER ISO 1302

NO.	ECN REVISION #	DATE	BY
B	REDRAWN WITH CHANGES	08/03/07	PAS
A	REDRAWN WITH CHANGES	06/18/07	PAS

MATERIAL: VENDOR
PROJECT/ASSEMBLY: FP – E030-0477
DRAWN: PAS DATE: 08/22/06
CHECKED: DATE:
GENERAL TOLERANCES: 0.X +/- 0.2 MM, 0.XX +/- 0.08 MM, 0.XXX +/- 0.013 MM; +/- 0.1 IN., +/- 0.01 IN., +/- 0.003 IN.
SHEET: A
ECN ORIGIN: 90-00123
SCALE: NA
TITLE: WIRING SCHEMATIC, 12V
DRAWING: DC1163
REPLACES:
DEUTZ CORPORATION ATLANTA, GA USA

B-ANSI-.DWG, 05/01

Appendix E:
Fire Pump Manufacturer
And
Installation Contractor
Start-up and Installation
Check Lists

DEUTZ FIRE PROTECTION ENGINE / PUMP CHECKLIST

TO BE COMPLETED BY ORIGINAL EQUIPMENT MANUFACTURER OF INSTALLING CONTRACTOR AND SUBMITTED TO DEUTZ CORPORATION PRIOR TO SCHEDULING START-UP INSPECTION

DEUTZ FIRE PROTECTION
Warranty Department
3883 Steve Reynolds Blvd.
Norcross, GA 30093
Email: DFPStartup@deutzusa.com

Part 1: JOBSITE PROJECT & EQUIPMENT DATA

Facility Name:

Mailing Address:	
City:	Postal Code:
State/Region:	Country:
Contact Name:	Phone #:
Fax #:	Email Address:

Jobsite Address:	
City:	Postal Code:
State/Region:	Country:

ENGINE INFORMATION

Model:	S/N:
Speed (RPM):	**Rating:**

OEM MANUFACTURER OF FIRE PUMP PACKAGE

Name:	Model:	S/N:
Rating(gpm/lpm):	Pressure: (psi)	Speed: (RPM)

CONTROLLER INFORMATION

Name: (mfr)	Model:	S/N:

INSTALLATION CONTRACTOR

Name:		
Phone #:	City:	Postal Code:

DEUTZ FIRE PROTECTION ENGINE / PUMP CHECKLIST

Part 2: CHECKLIST FOR PUMP REPRESENTATIVE OR INSTALLING CONTRACTOR*

	Initial	Date
A.) Engine-Pump alignment check; Service coupling/shaft as required.		
B.) Unit properly mounted & secured; base grouted.		
C.) Controller wiring connected to engine instrument panel.		
D.) Batteries serviced and charged 24 hours; connected to engine.		
E.) Cooling water connections properly installed on engine heat exchanger, both inlet and outlet; Confirm cooling water by-pass solenoid operation		
F.) Exhaust system properly sized, routed and connected to engine.		
G.) Cooling system filled to proper level with DEUTZ approved coolant. **NOT APPICABLE TO OIL COOLED 2011** (See DEUTZ engine operation manual)		
H.) Add DEUTZ approved engine oil to proper level. (see DEUTZ engine operation manual)		
I.) Fuel lines (both supply and return) connected to fuel tank and engine.		
J.) Fuel tank filled with clean #2 diesel fuel; drain water & sediment from tank.		
K.) Engine jacket water heater connected to correct AC power (after item G) or oil pan heater on 2011 engines (after item H).		
L.) Air inlet filter installed on engine; fresh air supply adequate for engine combustion and room ventilation.		

*These items are to be completed before DEUTZ CORPORATION FIRE PUMP START-UP AND INSTALLATION inspection

START-UP PERFORMED BY:

Company Name:		
Mailing Address:		
City:		Postal Code:
State/Region:		Country:
Phone #:	Email Address:	
Distributor Name:		
Individual Performing Start-up:		Date:

DEUTZ FIRE PROTECTION START-UP AND INSTALLATION CHECK LIST

RETURN COMPLETED FORM TO:

DEUTZ FIRE PROTECTION
Warranty Administration Department
3883 Steve Reynolds Blvd
Norcross, GA 30093
Contact: 1-800-241-9886
Email: DFPStartup@deutzusa.com

CUSTOMER AND PUMP LOCATION INFORMATION

NAME:

Mailing Address:	
City:	Postal Code:
State/Region:	Country:
Contact Name:	Phone #:
Fax #:	Email Address:

Jobsite Address:	
City:	Postal Code:
State/Region:	Country:

ENGINE INFORMATION

Model:	S/N:
Speed: (RPM)	Rating:

PUMP INFORMATION

Name: (mfr)	Model:	S/N:
Rating:(gpm):	Pressure: (psi)	Speed: (RPM)

OEM MANUFACTURER OF FIRE PUMP PACKAGE

Name: (mfr)	City:	State:

CONTROLLER INFORMATION

Name: (mfr)	Model:

INSTALLATION CONTRACTOR

Name:	Phone #:	City:	State:

DEUTZ FIRE PROTECTION START-UP AND INSTALLATION CHECK LIST

CHECK LIST

BEFORE ENGINE RUN

- ☐ Oil level, engine crankcase (see operators manual for approved oils & volumes)
- ☐ Coolant level, (see operators manual for approved coolant & volumes)
- ☐ Begin hour meter reading (hrs):_____
- ☐ Coolant protection, (Not applicable to oil cooled 2011)
- ☐ Coolant hoses checked for tightness and proper installation
- ☐ Check belt tightness
- ☐ Air intake system, check tightness, etc.
- ☐ Exhaust System, check tightness, etc.
- ☐ Fuel supply and return line connections, check tightness, etc
- ☐ Fuel tank full, other_____
- ☐ What is hose length from fuel tank to engine. _____
- ☐ Fuel suction hose diameter: _____
- ☐ Fuel return line diameter: _____

- ☐ Prime low pressure side, fuel system
- ☐ Check external bolts, fittings, coupling, etc.

Describe exhaust system

Total length of pipe _____
Diameter of pipe _____
Number of elbows 45 ^{o} _____ 90^{o} _____
Exhaust back pressure _____inches of HG
Rain protection: ☐Yes ☐No
Includes flex pipe and supported by building structure: ☐Yes ☐No
Engine block heater connected to dedicated power supply: ☐Yes ☐No ☐N/A

DURING ENGINE RUN

- ☐ Check speed, (RPM): _____
- ☐ Check for oil leaks; oil pressure (psi): _____
- ☐ Check for coolant leaks
  Coolant Temperature (^{o}F): _____
  Coolant loop pressure gauge reading (psi): _____
- ☐ Verify raw water flow (discharge)
- ☐ Check for external exhaust leaks

- ☐ Check for fuel leaks
- ☐ Test High coolant temperature alarm
- ☐ Test Low oil pressure alarm
- ☐ Test Over-speed shutdown
- ☐ Engine gauges functioning properly

AFTER ENGINE RUN

- ☐ hour meter reading at start of test (hrs): _____hour meter reading at end of test (hrs): _____
- ☐ Stamp start-up date on upper right corner of engine name plate
- ☐ Review with customer on who to contact for engine parts and service
  Customer acceptance of a maintenance contract ☐Yes ☐No ☐Pending
- ☐ Coolant level full

GENERAL

- ☐ Room air supply and ventilation equipment complete and adequate. List total dimension of inlet air opening _____W x _____H
- ☐ List total dimension of discharge air opening _____W x _____H

- ☐ Controller wired per supplier's instructions, "1" terminal in instrument panel used for cooling water solenoid
- ☐ Batteries filled, secured and connected:
  Cable size: _____
  Total length of battery cable (include pos & neg): _____
  Size of batteries: _____ Number of batteries: _____

START-UP PERFORMED BY:

Company Name:		
Mailing Address:		
City:		Postal Code:
State/Region:		Country:
Phone #:	Email Address:	
Distributor Name:		
Individual Performing Start-up:		Date:

GENERAL COMMENTS